

MANY NEW MOTORSHIPS RUN TRIALS

NEW YORK

SEATTLE

MOTORSHIP

Devoted to Commercial and Naval Motor Vessels

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DIESEL MARINE ENGINES FOR ALL CLASSES OF SHIPS



M^cINTOSH & SEYMOUR CORP.
AUBURN N.Y.U.S.A.

EXCLUSIVE technical and non-technical articles on design, construction and operation of oil-engines and motorships by the world's foremost writers on marine engineering.

MOTORSHIP

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Vol. VI

New York, U. S. A., October, 1921
Cable Address—Freemote, New York

No. 10

Loaded Sea Trials of the Motorship "William Penn"

IT is customary for the United States Shipping Board to run a loaded speed-trial of each of their vessels prior to their sailing on the maiden voyage, in addition to the builders' trials when light. So, on Sept. 3rd the loaded trials of the "William Penn" were run from the Ambrose Channel light-ship outside New York Harbor to Fire Island lightship and return, on which trials a representative of "Motorship" was present. In every way the trials were a complete success and were run-off without the slightest hitch.

Both in fuel-consumption and speed according to loaded displacement and power, the vessel gave results which put her in an American class entirely by herself—her performance being far ahead of any single one of the 2,280 merchant-steamships built under the supervision of the Shipping Board. The fuel-consumption attained was 0.308 lb. per i.h.p. hour for all purposes and the mean speed was 11.77 knots with a mean draught of 24 ft. and with the ship having a displacement of 14,250 tons.

Following the trials she made an excellent trip to Savannah, Ga., averaging nearly 11½ knots during the entire trip. It is obvious from the trial results that in service she will average 11½ knots fully loaded in fair weather. At times on trials she made over 12-knots through the water. She was not quite fully loaded on these trials as the balance of her cargo had to be taken aboard at Savannah. When between Jamaica and Colon, the "William Penn" wired to say a speed of 11.8 knots had been averaged for the previous 24 hours on 14 tons of fuel per day when she left Savannah the draught was 26 ft., 5 in. She arrived at Balboa at 4 P. M. Friday the 16th, six days from Savannah, and was reported 558 miles out of Balboa at 8 P. M. Sunday the 18th September. Assuming she stayed at Balboa taking oil as scheduled, the average speed figures out at 11.65 knots. During the loaded-trials near New York the vessel was found to be absolutely free from vibration and when sitting in the saloon it was not possible to tell by sound or movement whether the engines were running.

The exhaust was absolutely clear, while the temperature in the engine-room was only 82 degrees Fahr., altho it was a very warm day.

Most Successful Performance Made by the Shipping Board's Only Diesel-Engined Vessel.

Maneuvering trials following the speed trials also passed off successfully, the engine reversing from ahead to astern with simplicity, and responding very quickly to all signals without any hitch.

A complete description of the "William Penn" appeared in our issue of June, 1921, together with drawings and photographs of the engine-room arrangement. We reproduce herewith the principal specifications and the light-draught speed trials:

Fully loaded Displacement	17,100 tons
Displacement on Loaded Trials	14,250 tons
Dead-weight-capacity	12,375 tons
Net cargo-capacity on 10,000 miles voyage	11,725 tons
Fuel required on 10,000 miles voyage averaging 4,000 i. h. p. & 10½ knots	500 tons
Most suitable loaded-speed	11 knots
Actual cost of fuel for 10,000 mile voyage at 11 knots average speed	\$7,335
Fuel-Bill of Sister Steamer at 10½ knots average speed, with fuel at \$12.60 per ton	\$15,632
Fuel-Consumption of Sister Steamers for 10,000 miles voyage at 10½ knots average speed	1,320 tons
Cost in Fuel saved by "Wm. Penn" on 10,000 miles voyage	\$8,297
Length (O. A.)	455'0"
Length (B. P.)	445'0"
Breadth (M. D.)	60'0"
Depth (M. D. to S. D.)	36'8"
Draught (loaded)	28'4¾"
Gross tonnage	8,168 tons
Net tonnage	5,214 tons
System of Construction of Hull	Isherwood
Power (Indicated)	4,500 h.p.
Power (shaft)	about 3,500 h.p.
Fuel-capac. (inc' 157 tons in settling tank)	1,343 tons
Deep tank (for dry cargo or water ballast)	994 tons
Cubic-capacity of deep tank	34,770 cu. ft.
Hold capacity	520,550 cu. ft.
Total cubic capacity for cargo below decks	555,320 cu. ft. (bales)
Propellers (bronze twin four-bladed)	13'6" dia. by 11'9" pt.
Propelling engines	Burmeister & Wain 6 cylinder-four cycle
Cylinder bore	740 mm (29.134")
Piston Stroke	1150 mm (45.275")

Engine speed (designed)	115 R.P.M.
Total number engine-room crew	14 men
Full ahead to Full astern	32 Seconds
Daily fuel consumption in port	¾ ton
Daily fuel consumption at sea	13 to 14 tons

THE SPEED TRIALS WHEN LIGHT

(Mean of 3 Runs over Mile)

Speed averaged	12.592 knots
Indicated horse-power (Continental)	4,756 h.p.
Indicated horse-power (English)	4,690 h.p.
Revolutions	121.23 P.M.
Propeller-Slip	10.6%
Mean indicated pressure	84.6 lbs.
Maximum i.h.p. attained over one mile	4848 (Cont.)
Maximum i.h.p. attained over one mile	4780 (Engl.)
Maximum Revolutions	122 P.M.

Present at the loaded sea-trials several months later were the following:

Representing Construction Division U. S. Shipping Board

Mr. R. W. Robinson (Deck.)
Mr. O. H. Weise (Engine-Room).

Representing Repair Dept., U. S. Shipping Board

Mr. H. B. Taylor (Chief Turbine and Liest. Engr., in charge of trial). Representing Comm. R. D. Gatewood. Mgr. Maintenance and Repair.
Mr. P. J. Henning, U. S. S. B. Elec. drive, Diesel Inspector
Mr. W. D. Cosgrove, U. S. S. B.
Mr. D. S. Brierly, U. S. S. B.

Representing Wm. Cramp & Sons Ship & Engine Bldg. Co.

Mr. J. C. Shaw (Asst. Chief-Engineer).
Mr. Oscar Matteson (Guarantee-Engineer).

Representing Burmeister & Wain

Mr. Carstensen.

Representing "Motorship"

Mr. K. K. Dean.

Representing Barber S. S. Line

Capt. J. A. Hartley (General Mgr.)
Mr. S. P. Gledhill (Supt.-Engr.)
Mr. H. Barnes (Asst. Supt.-Engr.)
Capt. A. Wright (Commanding Officer).
Mr. P. Olson (Chief Engineer).
Mr. J. Sullivan (Pilot).
Mr. Trumble (Compass Adjuster).

The master of the vessel is Capt. R. H. Wright, and the Chief-Engineer is Mr. Oscar Olson.

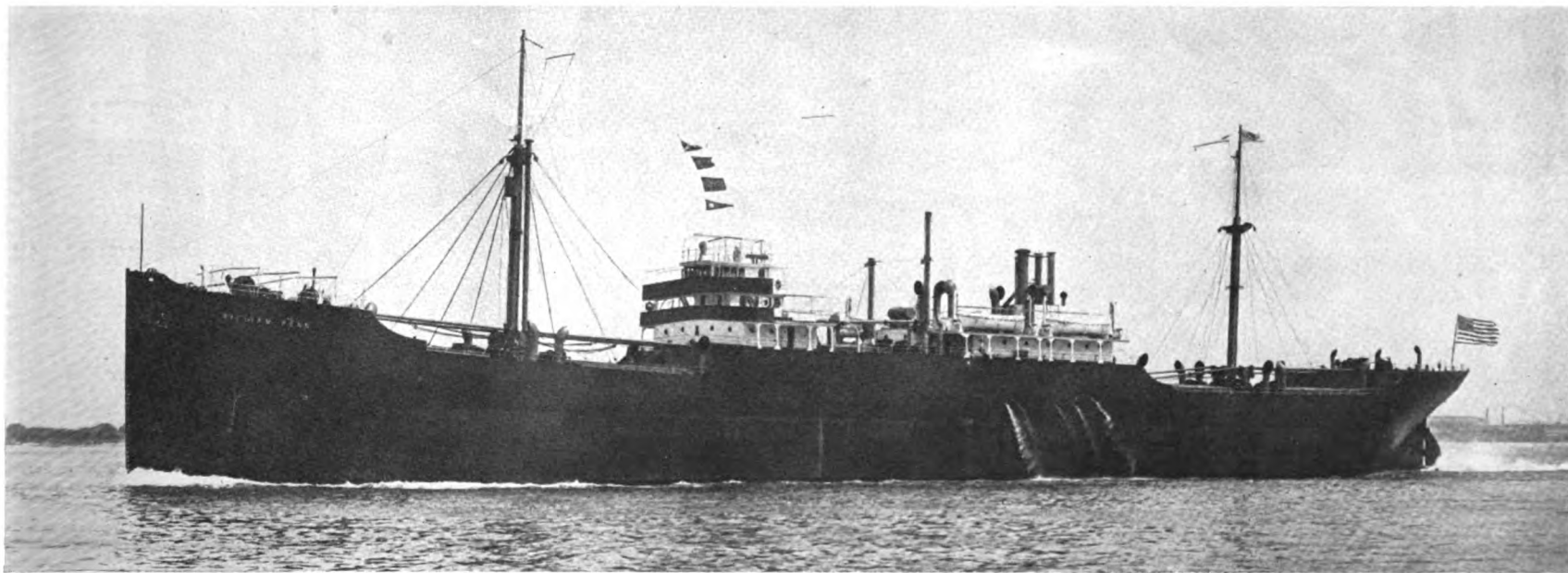
DEEP-DRAFT TRIAL OF M.S. "WILLIAM PENN"

September 3, 1921, Ambrose Channel Light-Ship to Fire Island Lightship and return.

Distance between light-ships	29.3N.-Miles
Speed over bottom Ambrose to Fire Island	11.98 Knots
Speed over bottom Fire Island to Ambrose	11.56 Knots

Mean speed of both ways..... 11.77 Knots

(Continued on next page)



U. S. Shipping Board motorship "William Penn," installed with Burmeister & Wain Diesel-engines by the Wm. Cramp & Sons Ship & Engine Co.

	To Fire Island With	To Ambrose Against
Tide Conditions.....	11.98	11.56
Speed in Knots over bottom.....	111.8	110.3
R. P. M. Starboard Engine.....	107.6	109.1
R. P. M. Port Engine.....	109.7	109.7
Mean Indicated-Pressure (kg. cm ²)		
Starboard Engine.....	5.97	5.91
Port Engine.....	5.76	5.93
Notches on Hand Control, Starboard.....	23	23
Notches on Hand Control, Port.....	23	25
I. H. P. Starboard (Metric).....	2,200	2,150
I. H. P. Port (Metric).....	2,043	2,131
I. H. P. total.....	4,243	4,281

Mean Revs. P. M. Ambrose to Fire Island.....	109.7
Mean Revs. P. M. Fire Island to Ambrose.....	109.7
Mean Revs. P. M. both ways.....	109.7
Slip in percent.....	7.5
Indicated H. P. Main Engines, Ambrose to Fire Island.....	4,243 (Metric)
Indicated H. P. Main Engines, Fire Island to Ambrose.....	4,281 "
Indicated H. P. Main Engines, Mean both ways.....	4,262 (English)
Indicated H. P. Main Engines, Mean both ways.....	4,202 (English)
Oil Consumption Main Engines.....	1,250 Lbs.
Oil Consumption two Auxiliary Engines.....	46 "
Oil Consumption all purposes.....	1,296 "
Oil Consumption per I. H. P. (English) Main Engines, all purposes.....	0.3083 Lbs.
Oil Consumption per I. H. P. (Metric) Main Engines, all purposes.....	137.9 grams
Mean Draft 24 ft. 0" with 5" trim aft—Corresponding to 14,250 tons displacement	

Run to Savannah

Mean speed from Ambrose Light-Ship to Entrance Buoy Savannah 10.84 knots from observation. Mean speed through the water estimated 0.6 to 0.7 knots more. Left Ambrose about 9 P. M. Saturday, Sept. 3rd, and arrived entrance buoy Savannah about 10 A. M. Tuesday, September 6th. Actual time 2 days, 13 hours, 37 minutes.

Distance over bottom—668 nautical-miles.

The vessel was not driven at full-speed due to undesirability of reaching Savannah earlier than noon, to go up the river on high tide.

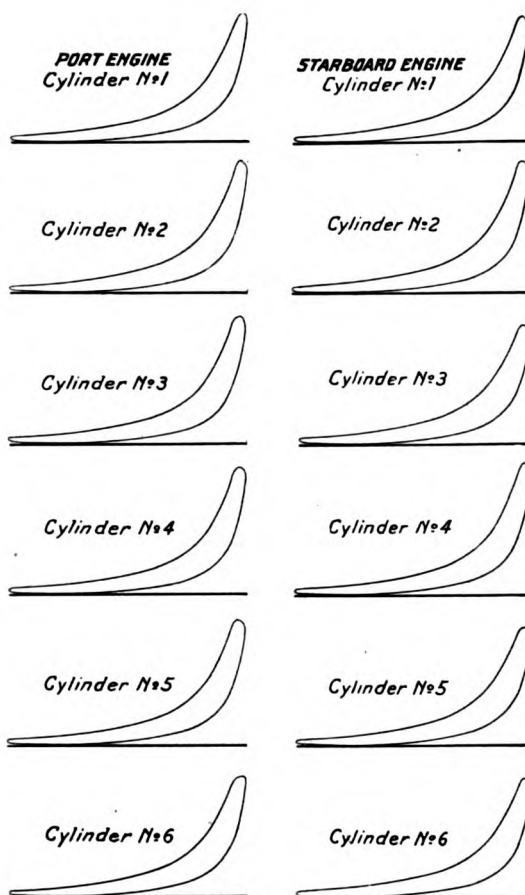
Mean Oil-Consumption per day....12.23 tons

On Monday, September 5th, data for an eight-hour period showed the following results:

R.P.M. 106. I.H.P. (Metric), 3,700. I.H.P. (English), 3,650. Oil-Consumption per I.H.P.H. (English), 0.315 lb. due, to reduced power. Fuel-Oil Consumption per day, 12.32 tons.

The vessel left Savannah Pier at about 2 P. M. Saturday, Sept. 9th, on high tide, and was reported Monday noon as averaging 11.5 knots over bottom, 110 R.P.M. and 4,275 (Metric) I. H. P. Draft leaving Savannah was 26 ft., 5 in.

The loading at New York consisted of 129,374 cases of oil and 500 barrels of grease, or 4,744 tons, which was loaded at the pier of the Tide-water Oil Company at Bayonne, and a miscellaneous cargo loaded at the Brooklyn Pier of the Barber Steamship Lines. The loading at Savannah consisted of 3,350 bales of cotton and 1,450 barrels of resin.



Indicator-cards taken on loaded trials of the "William Penn"

At New York 300 tons of addition fuel-oil at four cents per gallon (\$1.68 per barrel) was put aboard, making 1,200 tons total. Due to the short time allowed for filling in New York from lighter, the tanks were not completely filled. On the way to Panama all tanks will be filled by gravity from settling tanks between shaft alleys, and tanks filled at Panama and Honolulu, which latter place the vessel will also call. On leaving Honolulu there will be sufficient oil with all bunkers filled until the vessel arrives in New York, returning via Suez Canal and England.

The fuel-oil used on the trial off Long Island, September 3rd, and on the trip down to Savannah is the same as used on the light draft trials run in May. It is Diesel-oil as follows:

Specific Gravity.....	0.879 at 60° F
Corresponding to.....	29.4° Be

Flash (open cup).....	205° F.
Fire.....	226° F.
Viscosity (Saybolt) at 100° F.....	42
Sulphur percent.....	0.756
B. T. U. higher value.....	19,450 B.T.U.

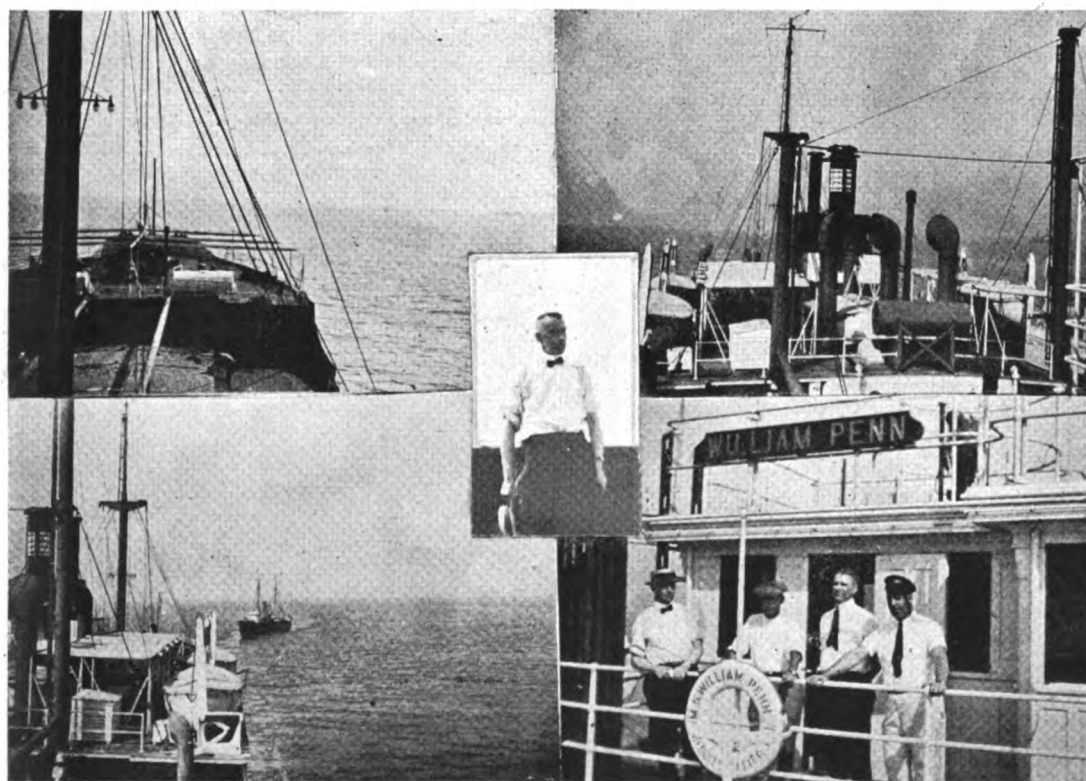
In figuring-out the total consumption per i.h.p. hour for all purposes the fuel-consumed both by the main-engines and the auxiliary-engine on the loaded sea-trials and light sea-trials was added together, but was divided by the total h.p. developed by the two main-engines only. To our mind, the total h.p. of the main-engines and one auxiliary-engine (two auxiliary engines if both are running) should be added together and use for figuring-out the total consumption. Therefore, in the case of the "William Penn" the fuel-consumption for all purposes should be calculated on a basis of 4,300 i.h.p., which would reduce the fuel-consumption per i.h.p. hour to below 0.30 lbs. because the main engines had an average out-put of about 4,230 i.h.p. and the auxiliary-engine about 70 b.h.p. As this was not actually done, the fuel-consumption per i.h.p. hour for all purposes is really less than that shown in the official figures. It will be interesting to receive the opinions of ship and engine builders on this particular point.

The electric winches were not used for putting case-oil on board, but a good test of them was made on the general cargo loaded at Brooklyn Pier and at Savannah. As holds No. 1 and No. 4 were completely filled with case oil only six of the ten winches were in operation on the three remaining holds.

The winches were remarkably free of trouble and were considered by the stevedores in both New York and Savannah as well as by the officers of the ship, as extremely satisfactory. The average load in New York, miscellaneous cargo, varied from 1 to 3 tons and at Savannah 1½ tons corresponding to six bales of cotton. The ease of operation and the speed of the winches was considered better than the average steam winch. The winches are particularly fast on light-hook, both raising and lowering, and it might be mentioned in this connection that heretofore criticism against the electric-winch has been due chiefly to too slow light hook-speeds.

These winches were developed by the Cramp Company to overcome the usual criticism of electrical winches as to speed, etc., the electrical equipment being supplied by the Westinghouse Company to special requirements and the winches constructed by the American Engineering Company.

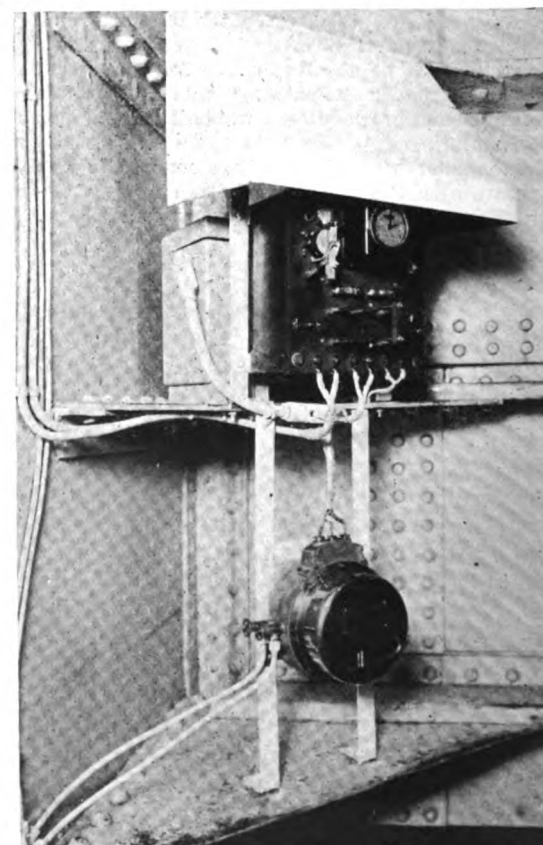
While loading in New York the fuel-consumption with the six winches in operation was from



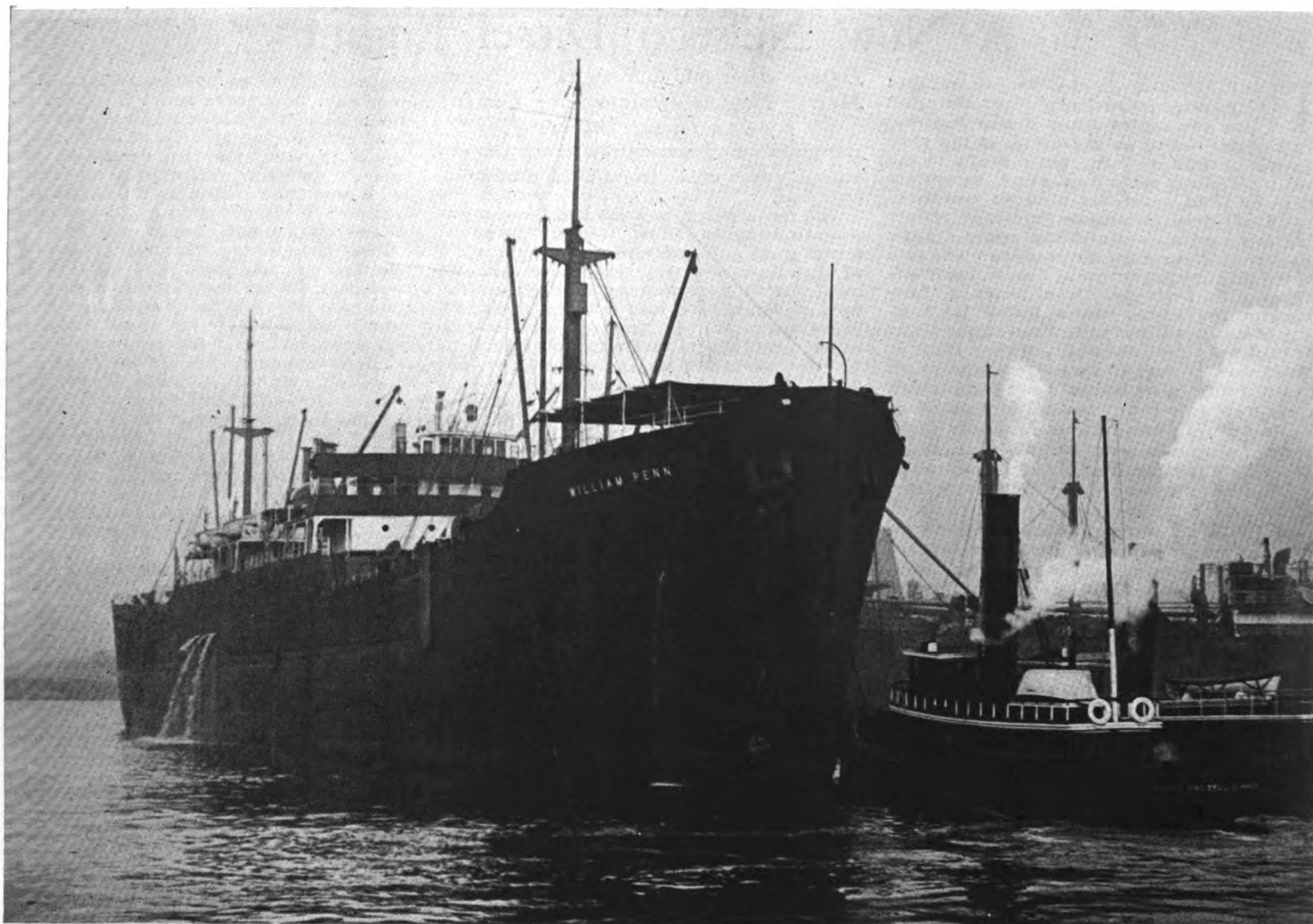
Scenes during trials of "William Penn"

1. Looking forward from bridge.
2. Looking aft, showing pilot vessel astern.
3. View of deck amidships showing exhaust-stack.
4. Left to right—H. B. Taylor, R. W. Robinson, J. C. Shaw and Capt. R. B. Wright.

Center—H. B. Taylor, in charge of trials.



Navigator Log installed in the engine-room of the motorship "William Penn"



American Motorship "William Penn" leaving the Tebo Basin prior to loading for her maiden voyage to the Far East.

90 to 100 gallons, or about one-third ton per day.

The cargo will be discharged at Yokohama, Kobe, Chinese Ports and Manila, and additional cargo taken on in the Far East, the Barber Lines already having arranged for same, the return being via Suez and England. The vessel was not loaded to full draft 28 ft., 4 3/4 in. at Savannah, due to the large amount of bulk cargo carried. The cargo, however, is such that a good record should be made as to earning capacity. The deep-tank forward of engine-room, which in corresponding steamers going on such a long-voyage is used for fuel-oil, has been loaded with special cargo.

It is interesting to note that this vessel has a Navigator log installed in the engine-room for taking readings of the distance covered by the ship. This log is operated on the Pitot principle and consists of four main parts; namely, the bottom-cock, Pitot-tube, main instrument and distance recorder. In addition there is a storage-battery for electrical transmission and a panel for the same, the Bottom-cock is secured to the skin of the ship and a central hole is drilled for the Pitot tube. The Pitot-tube is pushed through the Bottom-cock and extends about 6 in. below the ship's bottom. This tube is held securely in place and no leakage of water is possible, although it can be readily removed for cleaning.

The Pitot tube is in reality two tubes in one, the inner tube being used for speed pressure and the outer tube for static pressure. A small hole at the bottom of the tube facing forward, permits entry of water for speed pressure and another hole of equal size, placed at the side, permits entry of water for static pressure. Both the speed and static pressure is led to either side of a diaphragm through small copper pipes. This diaphragm is located at the back of the main instrument which is placed in the engine-room below the water line. As soon as the vessel moves ahead the speed pressure increases and forces the diaphragm forward. This movement of the dia-

phragm is mechanically transformed to indicate the speed, and is in turn transformed by electrical means into the distance which is recorded by the distance recorders placed at any part of the vessel.

We have seen a communication sent from Savannah by Chief-Engineer Oscar Olson stating that the total distance of run was 668 miles by observation, whereas by the Navigator Log it was 668 1/3 miles. The following are records of readings shown by the Navigator log on the trials.

Time	Speed in Knots	Distance Reading Nav. Log	Distance Covered Nav. Log	Distance Covered T. R. Log	Chart Distance	Remarks
7 47 a.m.	....	902.65	....	....	....	Sailed 7.47 a.m. Pitot tube in place 7.55 a.m.
8.30 "	9.5	905.1	2.45	....	....	....
9.00 "	10.2	910.1	5.00	....	....	....
9.04 "	10.1	910.85	0.75	....	....	....
9.30 "	10.2	915.6	4.75	....	....	....
10.00 "	11.2	919.9	4.3	....	....	....
10.30 "	4.2	....	....	....	....	Maneuvering and adjusting compass.
11.06 "	11.0	923.45	3.55	....	....	Ambrose Light Abeam. T.R. Log put over.
11.30 "	11.3	927.8	4.35	....	....	....
12.00 noon	11.5	933.3	5.5	....	....	....
12.06 p.m.	11.6	934.65	1.35	....	....	Distance from Ambrose Light by Nav. Log 22.35 miles.
1.06 "	11.75	945.8	11.15	21.5	....	Fire Island Light Abeam. Distance from Ambrose Light by Nav. Log 28.35; by chart 29.8 miles.
1.37 "	11.75	951.8	6.0	28.4	29.8	Adjusted Nav. Log to give higher reading.
2.15 "	12.5	957.55	5.75	....	....	Returning Fire Island Light Abeam.
4.15 "	12.4	980.9	23.35	....	....	....

4.47 "	12.6	987.3	6.4	....	29.8	Ambrose Light Abeam. Dist. cov. Nav. Log 29.75 miles By chart 29.8 No reading taken T. R. Log.
5.29 "	12.5	995.3	8.0	....	....	....
6.04 "	4.9	1000.2	4.9	....	....	At anchor Gravesend Bay.

Comparison of Log Distances and Chart Distances From Bearings

	Reading Nav. Log Knots	Reading Taffrail Log Knots	Chart distance Knots
Fire Island Light Abeam.....	543.5	0.0	....
Ambrose Island Light Abeam.....	573.3	30.7	....
Buoy No. 1 abeam. Distance run.	29.8	30.7	29.8
Ambrose Channel Light to buoy No. 1.....	584.4	....	....
	11.1	....	11 1/4

Record of Speed Indicated by Log on the Shipping Board's Turbine-Electric Steamship "Invincible" for Comparison with performance of the Diesel-driven "William Penn"

7.15 P. M. April 30th to 12.21 A.M. May 1st, 1921

Time	Knots	Engine telegraph signals
7.15 p.m.	11.00	Full speed ahead.
7.30 "	11.25	"
7.45 "	11.50	"
8.00 "	12.00	"
8.15 "	12.33	"
8.30 "	12.35	"
8.45 "	12.50	"
9.00 "	12.35	"
9.15 "	11.00	"
9.30 "	10.75	"
9.45 "	10.50	"
10.00 "	10.50	"
10.15 "	11.50	"
10.30 "	11.25	"
10.45 "	10.30	"
11.00 "	10.50	"
11.15 "	10.50	"
11.30 "	10.50	"
11.45 "	9.00	Slow ahead.
11.55 "	7.25	Half ahead to full.
12.00 m.	9.75	Full speed ahead.
12.03 a.m.	9.75	"
12.05 "	9.00	Half speed ahead.
12.15 "	8.00	"
12.21 "	7.75	Stop.

A New Nelseco Diesel Engine

UNDOUBTEDLY in the foremost rank of American Diesel-engine constructors are the New London Ship & Engine Company, whose large works on the banks of the river Thames at Groton, Conn., are a credit to the country. As our readers are aware, we are not given to undue praise, but when we visited the leading oil-engine factories in Europe, we did not find any more modern or better equipped shops than the chief American Diesel-engine works such as the McIntosh & Seymour at Auburn, the Busch-Sulzer at St. Louis, the Winton Works at Cleveland, the Worthington plant at Buffalo, the Nordberg at Milwaukee, the Pacific Diesel Engine Works at Oakland, the Fairbanks Morse plant at Beloit, and the one in question at Groton, so we feel that there is no need of hesitation in giving them their due credit. In fact we know of no single European country whose combined Diesel and surface-ignition engine facilities can equal the above eight factories. Diesel-engine construction has only made further progress in Europe because of the whole-hearted support and co-operation extended to manufacturers by shipowners, whereas progress both in point of numbers of engines and power has been limited and even retarded in this country by the meagre and reluctant support given by private shipowners, and by the Shipping Board when it was responsible for the construction of 2,312 merchant ships aggregating 13,636,711 tons.

The Nelseco engine,—as the Diesel built by the New London Ship & Engine Company is named,—is not so well-known in commercial shipping circles as among naval men, because since 1910 the company's facilities have been principally devoted to constructing submarine-type engines for the United States and foreign navies, including thirty-two British submarines. Nevertheless, the Company has completed about twenty installations in merchant-craft, some of which have shown over seven years' steady service. In the future more

Details of a 600 b.h.p. All-American Marine Engine Designed for Electric and Direct Drives

active attention will be turned to the commercial-craft field.

With this object in view the first Diesel-engine of a new design has recently been completed and a number of shop-tests run at Groton, in which all past experiences are incorporated, with the result that while the main distinctive Nelseco features of design have been retained, a much-improved engine has been produced. Two specific objects were borne in mind when laying down the design, namely, that the engine should be ideal for Diesel-electric-drive, and to also serve as a moderate-speed direct-drive engine merely by changing the cam-shaft, air-starting and fly-wheel. In this way engines are secured for two marine purposes with production costs at the lowest possible figure, and incidentally the stationary field is also covered.

At the time of our recent visit to the New London Company's plant to see this new engine, we noticed another economy being carried-out, namely the laying-down of four new Niles-Bement-Pond crankshaft lathes, with which crankshafts of all Nelseco Diesel-engines will in future be machined direct from solid-forged blanks, each blank being sawn vertically through center of original billet and from the two pieces the two halves of the shafts are machined. In addition to effecting manufacturing economy, the builders consider that greater strength will be secured as well as freedom from possible hair-cracks or segregations to which shafts forged from one billet are occasionally subject, owing to the original central pipe not having been entirely removed.

Through the courtesy of the builders we are enabled to give sectional and general arrangement drawings of this new engine, as well as a photograph, which will give a comprehensive con-

ception of its design and appearance. It is a six-cylinder trunk-piston model of the four-cycle type rated at 600 b.h.p. at 225 r.p.m., but will actually develop close upon 700 shaft h.p. for continuous operation. In fact, during one of the tests 875 shaft h.p. was maintained for a short period with only a slight sign of smoke in the exhaust. At full power (rated) the mechanical efficiency of this engine is just under 80%.

It was found on tests that from full-load to no-load there was only about 3½% variation in the revolutions. When the load of the electric-generator was thrown on or off suddenly there was virtually no momentary rise or fall in speed, except a first surge of a few revolutions when instantly changing from full-load to no-load, or vice versa, indicating that the action of the governor is most excellent. Smoothness and absence of vibration are noteworthy to the observer.

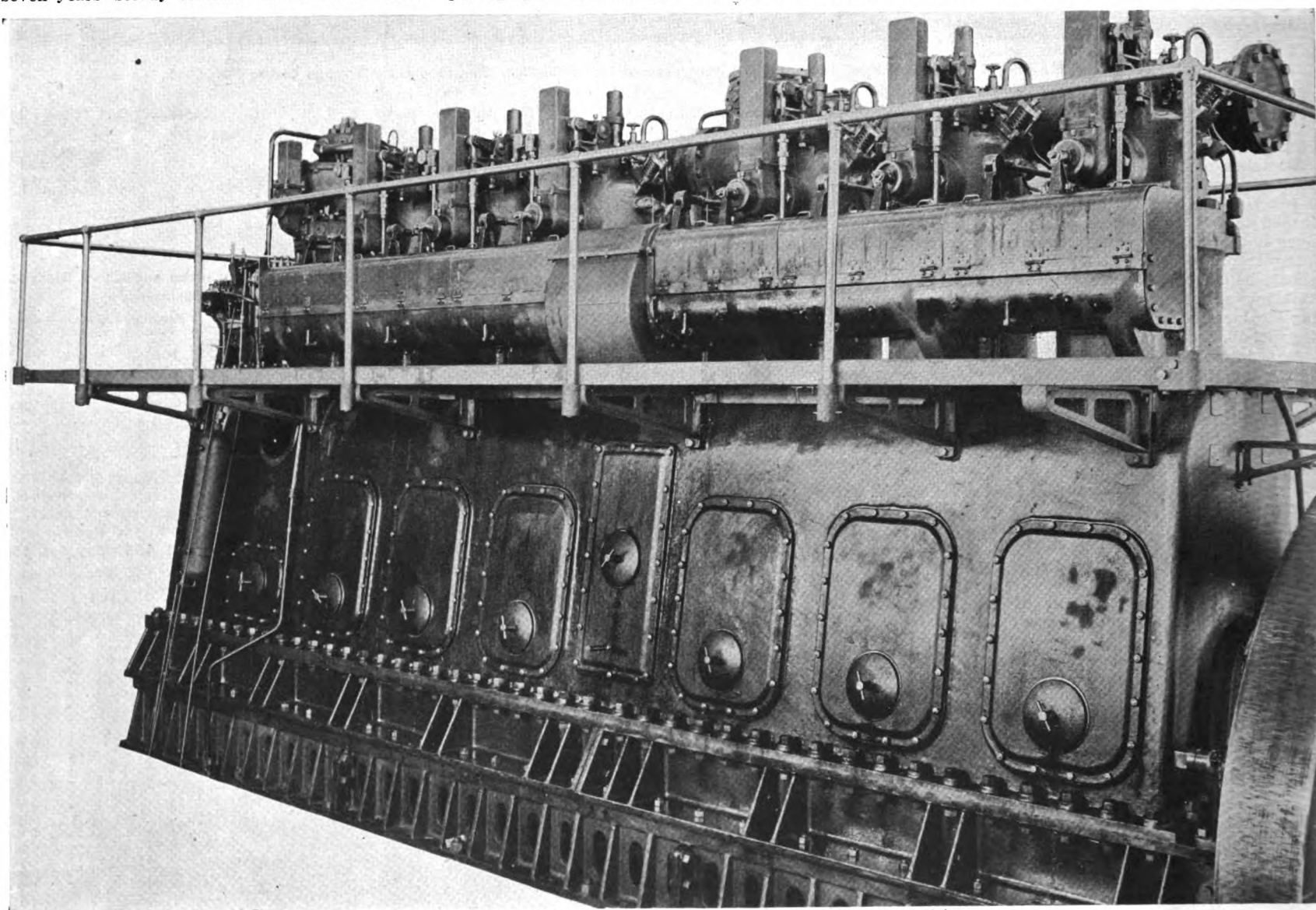
Another test was made with the speed varying as they may when direct-connected to a propeller on board ship. It was found that with the speed reduced to about two-thirds—when the output is only approximately one-fourth of full-power—the fuel-consumption figures-out at only 0.52 lb. per shaft h.p. hour.

At normal full-load tests showed the consumption of fuel to be 0.42 lb. per shaft h.p. hour, and no change when developing 25% overload. This is very excellent for an engine of medium speed and weight. It is interesting to note that the marine fuel-consumption curves are much flatter than the curve when operating on an electric-generator. The fuel-consumption results at constant speed on Diesel oil are as follows:

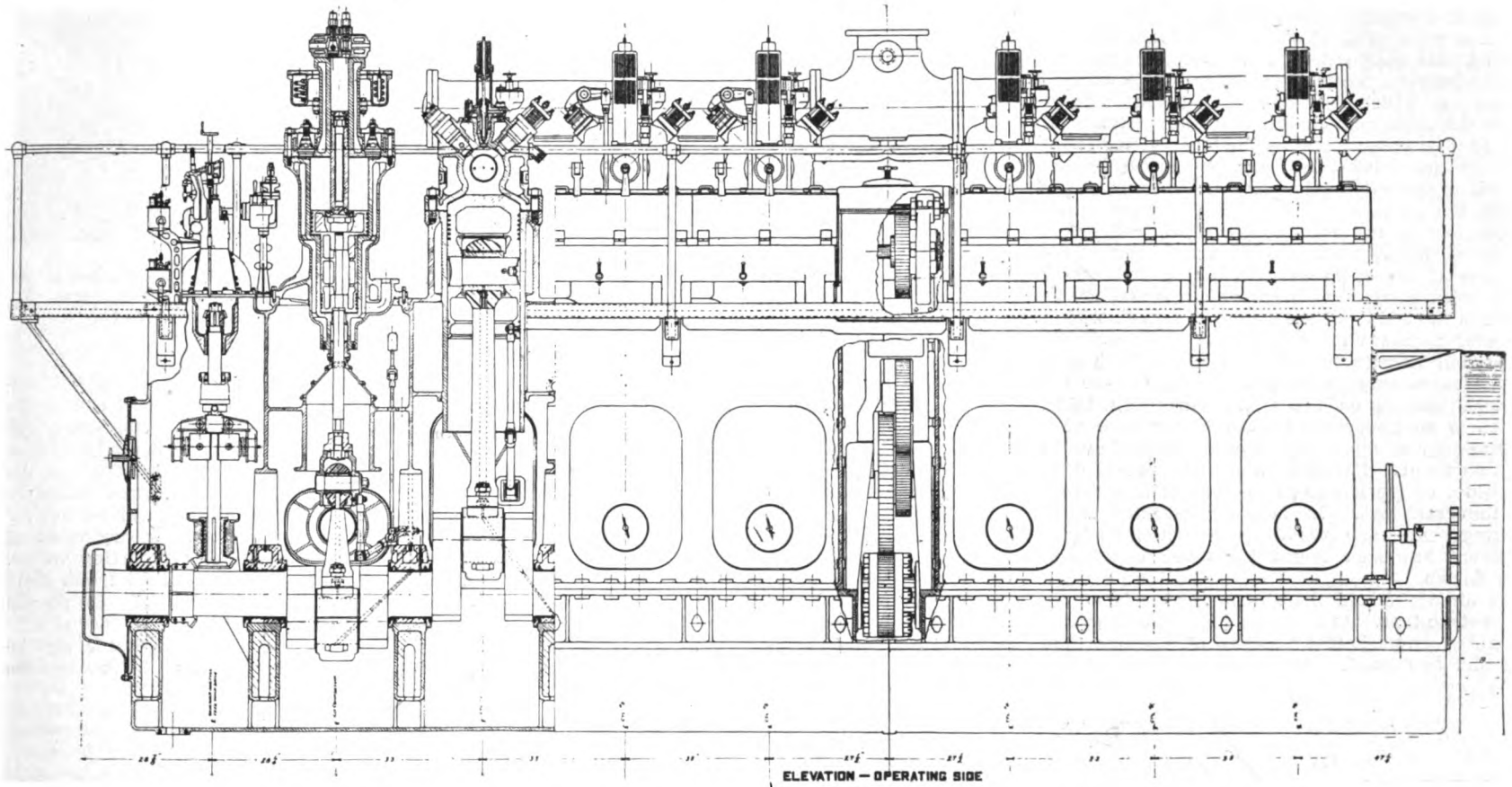
25% overload	0.42 lb. per b.h.p. hour
Full power	0.42 lb. per b.h.p. hour
¾ load	0.45 lb. per b.h.p. hour
½ load	0.51 lb. per b.h.p. hour
¼ load	0.67 lb. per b.h.p. hour

Before giving a technical description of the engine we will give its general dimensions:

Weight (short tons) 53 tons



The new 600 b.h.p. Nelseco Diesel-engine for electric and direct drives



Sectional and general arrangement drawings of Nelseco 600 b.h.p. Diesel-electric drive marine-engine

Weight per shaft h.p. (600 b.h.p.) 191 lbs.
 Length (O. A.) 27 ft.
 Width 5 ft. 8 in.
 Height above shaft center 10 ft.
 Overall height 13 ft. 5 in.
 Normal and rated power 600 b.h.p.
 Maximum power, for continuous running, 700 b.h.p.

Of course, this engine is not suitable for direct-drive with large cargo-ships, but for direct-drive with small commercial vessels such as trawlers, ferries, harbor-service boats, tugs, coastwise tankers, shallow-draft river-boats, and freighters up to about 1,000 tons d.w.c. in single-screw installations, or up to about 2,000 tons with twin-screw motorships. In these cases the engine is arranged to be directly reversible.

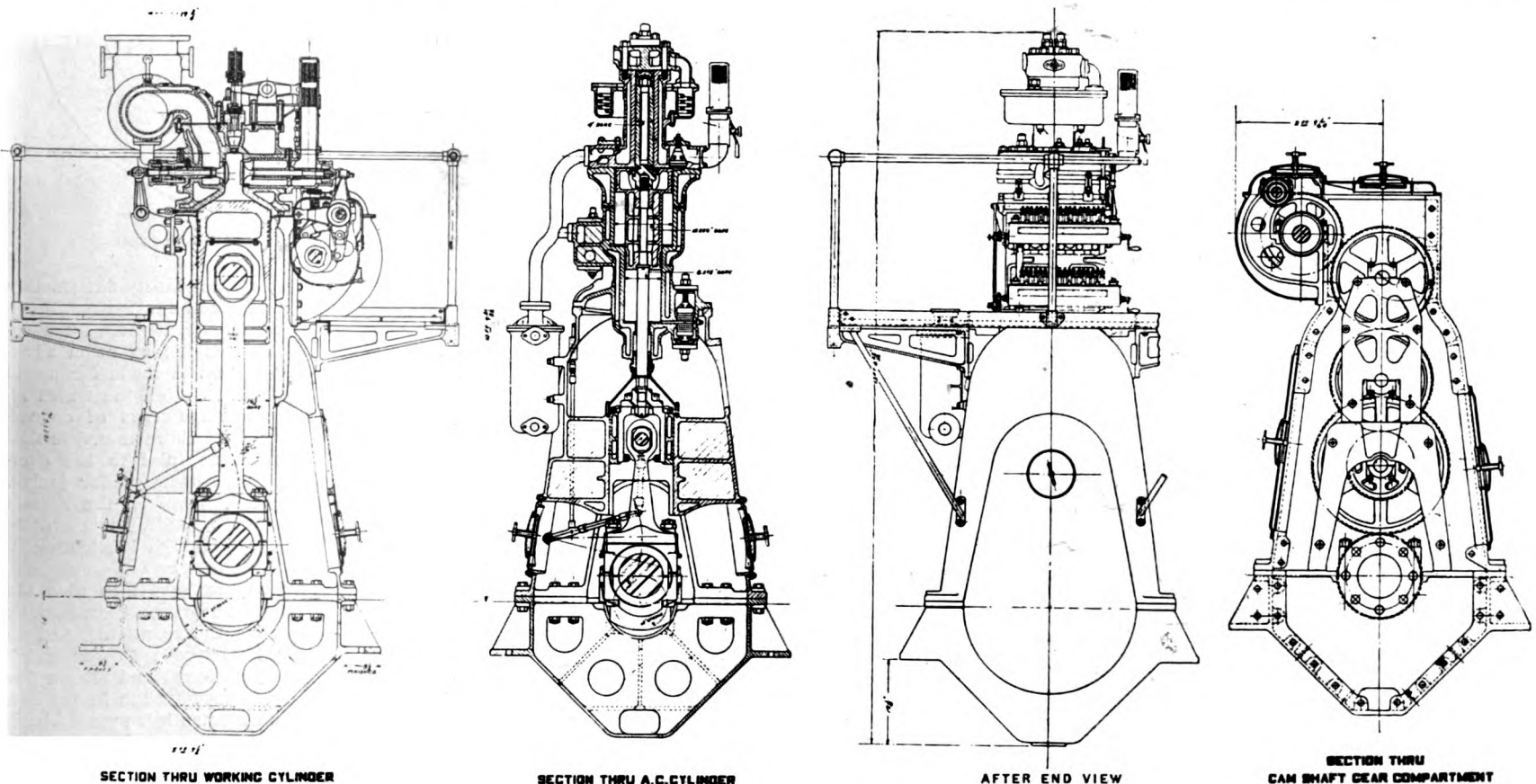
But, for large freighters, passenger-vessels and tankers up to about 12,000 tons d.w.c. and 4,000 h.p. this engine is made non-reversible and used

in conjunction with electric transmission. In these cases several engines make up the total power required, although any one unit would be sufficient to bring the vessel home at reduced speed in case of accident to the others. At the same time it must be pointed out that a totally disabled modern direct-driven Diesel ocean-motorship is practically unheard of today.

For Diesel-electric drive of a cargo-ship requiring 2,000 shaft h.p. (about 2,600 i.h.p.) four of these 600-700 b.h.p. units, each connected to a 400 K.W. electric-generator, would be installed in the engine-room and these would provide the current for a single electric propelling-motor. Control of the latter can be placed on the navigation-bridge, or at any other part of the ship independent from the engine-room, thus eliminating delays or misunderstandings when maneuvering. Readers of "Motorship" will remember that the first

American Diesel-electric vessel was the Gloucester trawler "Mariner," which was propelled by twin 240 b.h.p. Nelseco Diesel-engines, which has given the builders some very interesting experiences that will be found most valuable when carrying-out a large merchant-ship installation.

It will be noted from the illustrations that the six working cylinders of the engine are in line with the single three-stage air-compressor at the forward end. Forward of the air-compressor is the fuel-pump and governor. The bedplate and housing are of exceptionally rigid design and construction, the housing being carried right-up to the tops of the cylinders and the cylinder-liners forced into the housing with a space between which forms the water-jacket. Detachable cylinder-heads are bolted directly to the top of the housing. All of the valves in the cylinder-head are arranged horizontally, and are operated from the camshaft



SECTION THRU WORKING CYLINDER

SECTION THRU A.C. CYLINDER

AFTER END VIEW

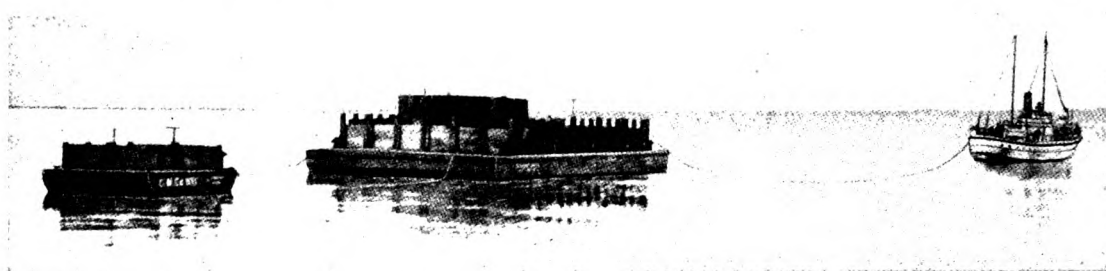
SECTION THRU CAM SHAFT GEAR COMPARTMENT

which is carried in brackets on the side of the housing by means of vertical rocker-arms.

With this design there is a space of about six inches between the injection-valve nozzle and the piston top, which aids good combustion and prevents burning and cracking of the pistons. It has been suggested that undue wear of the lower side of the valve-stems may be caused by the weight of the valve being constantly borne at one point, but in actual practice this has not transpired, nor is any detrimental effect anticipated by the designers. The camshaft and much of the valve-gear, are enclosed in a casing and driven by a train of spur-gears from the crankshaft, located in the middle of the engine between working-cylinder numbers three and four.

We will mention that the bearings at both ends of the connecting-rod as well as every other important bearing on the engine are adjustable, which is an important feature in the case of a marine-engine, where shims occasionally have to be taken out. Large openings are provided in the sides of the housing to permit of free access to the crankcase. In fact, accessibility to all bearings and parts requiring inspection and adjustment has been thoroughly taken care of in this design.

As already stated the air-compressor is of the three-stage type. In this case the piston is driven from the crankshaft by means of a connecting-rod and crosshead. Advantage is taken of this



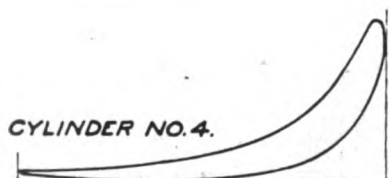
The Nelsec-Diesel powered "Ambassador," loaded with 50 tons cargo, and towing two loaded scows aggregating 1,000 tons deadweight from Tacoma to Chickagoff, a distance of 961 nautical-miles in 195 hours running time, averaging 190 R.P.M. and 5 knots. Fuel-used 3,217 gallons. Oil used 48¾ gallons

opportunity to separate the compressor-cylinders entirely from the crankcase, providing an accessible machine as well as avoidance of all trouble due to lubricating-oil in the cylinders, which was a fault found too frequently in early marine Diesel-engines, and occasionally met with even to-day.

For fuel-injection fuel-pumps provide a separate plunger for each working-cylinder and is driven directly from the crankshaft by means of a vertical shaft and suitable gearing. On this vertical shaft is mounted the governor which is of the constant-speed type for engines designed to drive generators, and of the limit-speed type for direct-connected marine-engines. All controls and also

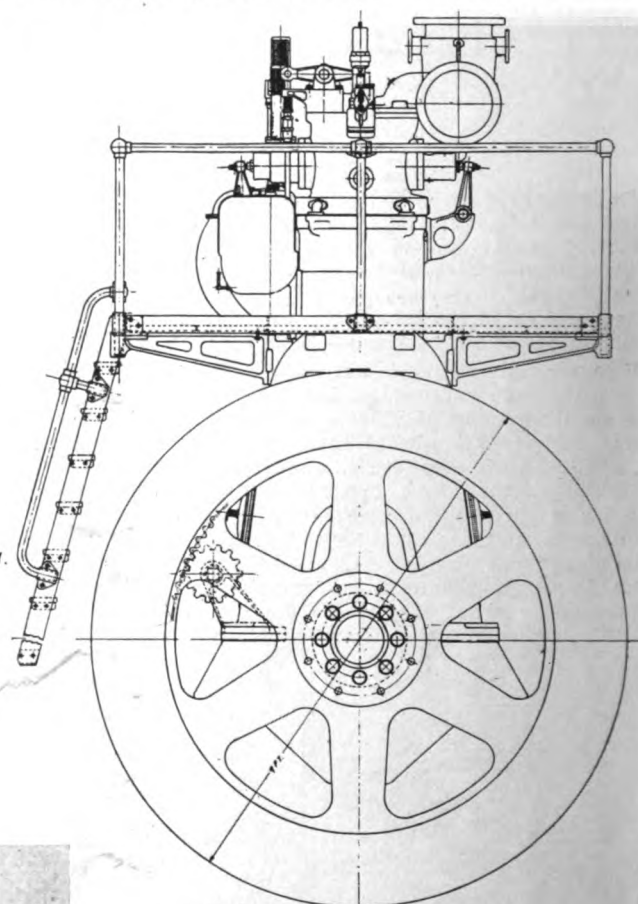
the reversing-gear for the directly-reversible marine-engine are located at the forward end of the engine and on the upper platform that is at the fuel-pump and air-compressor end, and here, of course, the operator's station is located. In the case of generator engines, only three cylinders will be fitted up with air starting valves, but for direct-reversible engines it is necessary to fit all of the working-cylinders with air-starting valves. Starting-air for this purpose will be taken from storage tanks, and a maximum of 350 pounds pressure will be used.

Independently driven circulating-water and lubricating-oil pumps are provided, as the Nelsec

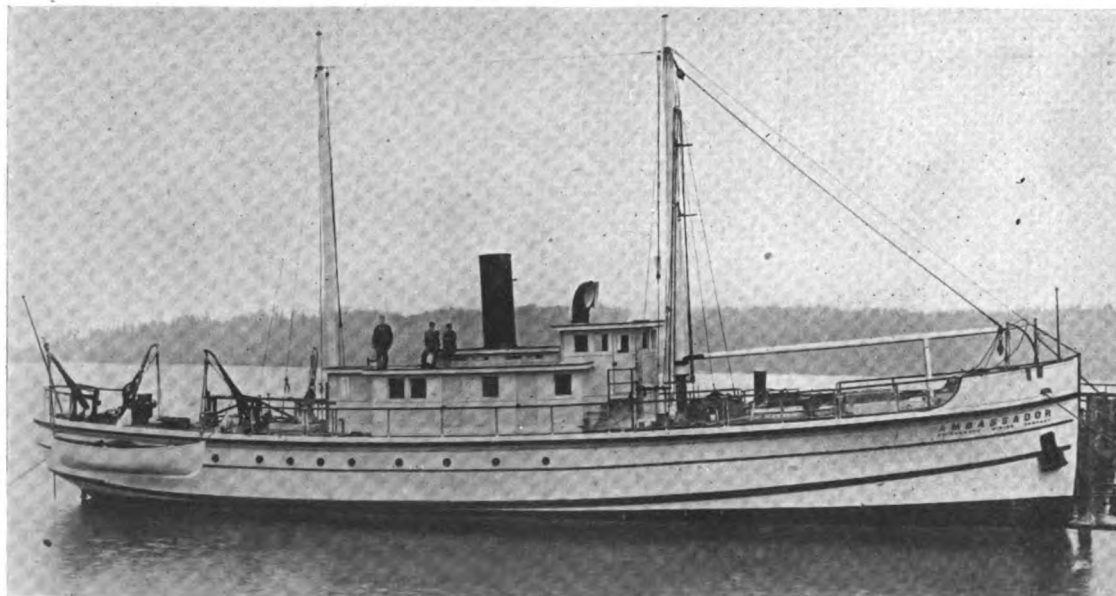


SPRAY AIR = 950 LBS. PER SQ. IN.
R.P.M. = 225.
AVERAGE COMPRESSION PRESSURE = 480 LBS PER SQ. IN.
AVERAGE M. I. P. = 88.3 LBS. PER SQ. IN.
AVERAGE I. H. P. = 128.6.

Set of indicator-cards taken on test of Nelsec 670 b.h.p. Diesel-engine



Forward end view of Nelsec engine



"Ambassador," a 100 tons motor-vessel owned by the Chickagoff Mining Co. of Tacoma, and in their Alaska service. She is one of the many American commercial craft propelled by Nelsec Diesel-Engines and has a 360 b.h.p. reversible motor running at 240 R.P.M. Speed 11 knots

designers consider this the most satisfactory method, but provision is made for fitting direct-connected pumps at the forward end of the engine in such special cases as it may seem advisable or necessary. Provision is made for ample water-jackets on all parts of the engine which require cooling, and the arrangements of connections and areas are such that there is a free flow of circulating-water from the inlet to the over-board discharge from the exhaust-header jacket.

For the lubricating of the engine, the system used can best be described by calling it a gravity forced-feed. With this system the lubricating-oil flows from the gravity-tank which is at a sufficient height above the engine crankshaft to give the proper pressure to the main-bearings, then through holes in the crankshaft to the crankpins, and up the inside of the connecting-rods to the wrist-pins. The crankcase is enclosed and all surplus oil drains to a suitably formed trough in the bottom of the bedplate from whence it is pumped back through suitable strainers to the gravity tank. All of the important bearings are thus under forced-lubrication and a free flow of oil is circulating

through them at all times. The camshaft parts are oiled by splash from oil carried in the bottom of the trough of the camshaft casing. All cylinders and exhaust-valve stems are taken care of by mechanical oilers, and the minor valve-gear bearings are fitted with oil-cups for hand oiling.

In order to corroborate our remarks regarding the importance in the Diesel-engine building field of the New London Ship & Engine Company's factory, we will give a few general details of the same, as follows:

Area of plant.....	36.8 acres
Length of water front.....	3,140 lineal ft.
Main wharf length.....	150 ft.
L. head of wharf.....	100 ft.
Cove dock wharf No. 1.....	140 ft.

Cove dock wharf No. 2.....	310 ft.	
Machine shop.....	717 feet x various widths from 105 ft. to 190 ft.	
	Ground area	Floor area
	104,300	155,050
Store House and Pattern Shop 310 x 60.....	18,600	36,600
Heating plant 85 x 48.....	4,080	3,650
Iron and Steel Foundry 180 x 80.....	14,400	23,400
Auto Truck Garage 35 x 25....	875	875
Ferry House 20 x 15.....	300	300
Pump House 15 x 10.....	150	150
Rigging Loft 40 x 15.....	600	600
Reclamation Dept. 90 x 40....	3,600	5,200
Forge Shop 127 x 110.....	13,970	13,375
Forge Office 35 x 30.....	1,050	924
Gate House 12 x 40.....	480	394

Administration Bldg.....	16,365	29,900
Office Garage.....	1,600	1,600
Vanadium Brass Foundry....	15,780	16,350
Area Nelseco Park.....		10.0 acres
Area Farm Property.....		8.3 acres
Area Hotel Property.....		0.36 acres
Office annex Nelseco Park.		
Twenty-four Cottages in Nelseco Park.		
Two Barns Farm.		
Nelseco Hotel Ground Area, 3,450 square feet.		
Floor Area 12,656 square feet.		

It will be noted that the machine-shop alone is over 700 ft. long by 130 ft. wide. Then it has to be considered that this entire plant is devoted to Diesel-engine construction and repair, no other product being manufactured, with the exception, we believe, of some torpedo-tubes during the war.

Single-Screw Slow-Speed Diesel Motorships "Sulina" and "Leise Maersk"

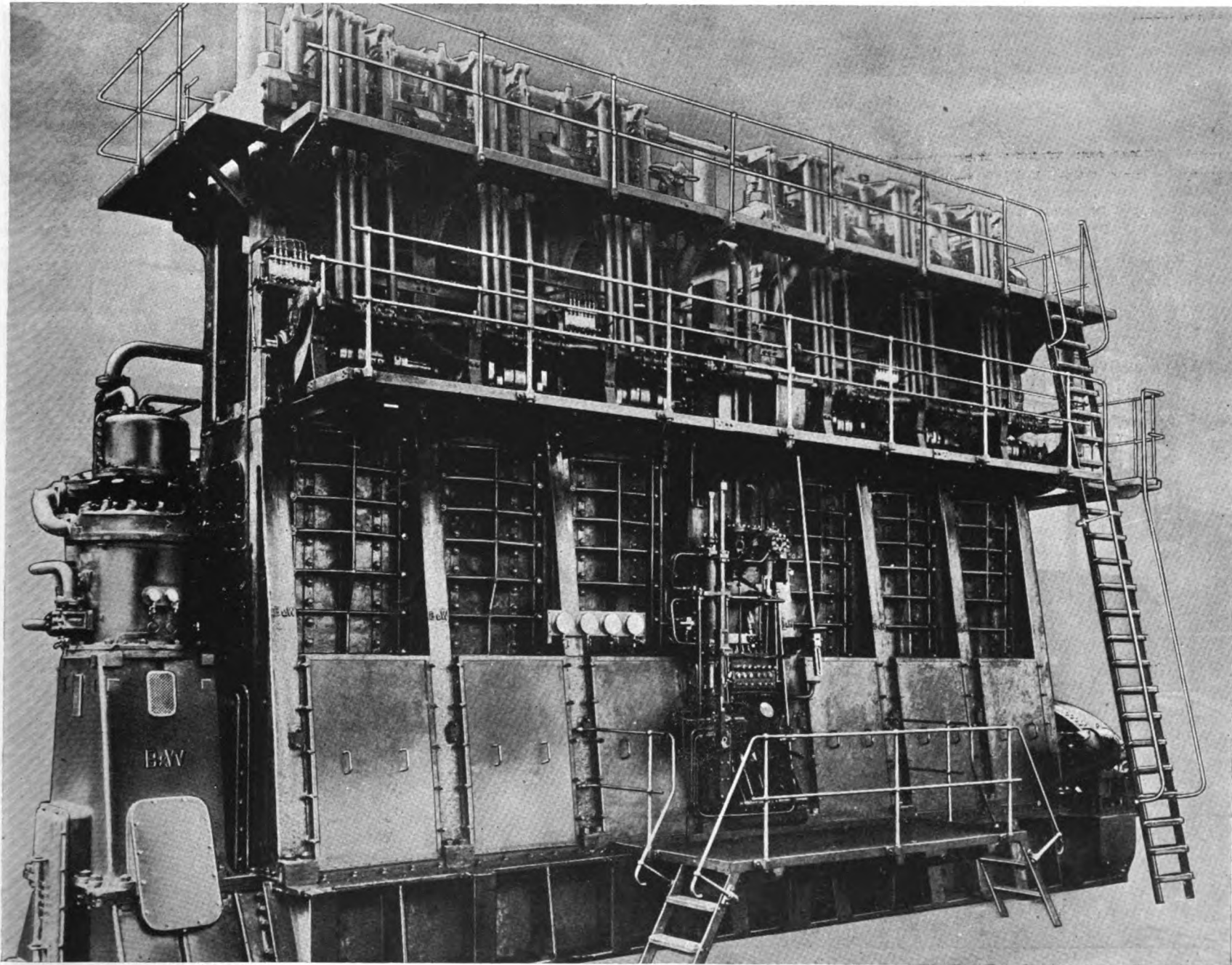
TRIALS were recently run in Sweden of two very important merchant motorships the operation in service of which will be closely watched by shipowners and shipbuilders of all maritime countries because they are the first two vessels propelled by the new Burmeister & Wain-Götaaverken slow-speed Diesel engine specially designed for single-screw ships. Their completion is another milestone in the progress of motorship development. Particularly in this country should the results of their design and working be known, because several domestic builders are working

Sixteen Hundred Horse-Power At 85 R.P.M. In An Engine-Room 42 ft. Long.—Third Sister Motorship Now Building

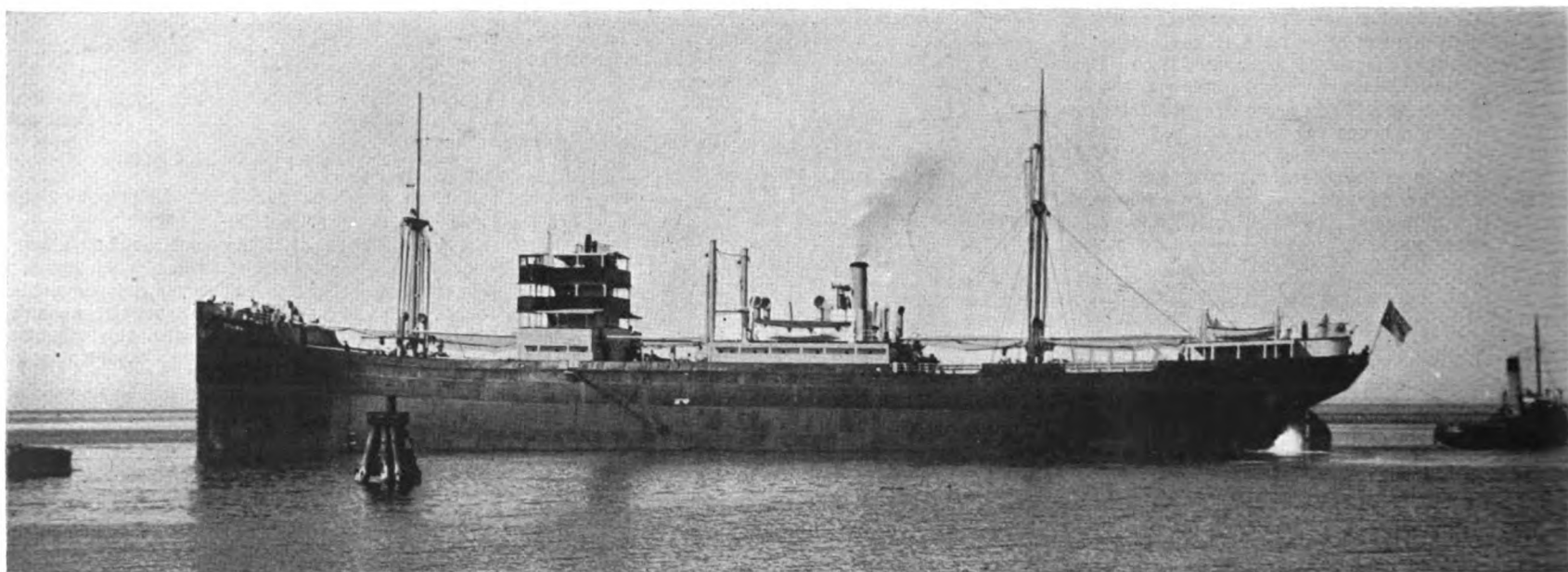
on plans for slow-speed engines, having in mind the probable conversion of many existing shipping board steamers without changing the present propeller-shafting and propellers, so as to reduce the conversional cost to a minimum. Another reason for local interest is that the Wm. Cramp &

Sons Ship & Engine Co., may shortly start work on a similar engine, but of higher power, they being the U. S. licensees of the designers. No definite decision, however, has yet been made at this Philadelphia shipyard.

Our readers will remember that we gave exclusive details of the design of this new engine on page 216 of our issue of March, 1921, while in our issues of January (page 44) and March, 1921 (page 217), we gave drawings and preliminary descriptions of these vessels. At that time the vessels had not been named. They are the "Sulina"



The new 1,600 i.h.p. slow-speed Burmeister & Wain Diesel-engine for single-screw ships



The new single-screw motorship "Sulina" getting ready for her trial-run

built by the Oresunds Shipyard at Landskrona for the Swedish Lloyd and the "Leise Maersk," built by the Odense Shipyard for the Svendborg Steamship Co. (A. P. Moller) of Copenhagen, who controls the latter yard and a third single-screw ship is completing at the Eriksberg yard, also for the Swedish Lloyd. The Swedish Lloyd Line is controlled by the Dan Bröstrom & H. Metcalfe interests, who will shortly order a 20,000 tons 18 knot, 8,000 i.h.p. Diesel-driven transatlantic passenger liner for the Swedish-American Line.

Mr. Bröstrom recently stated that he will only consider motorships for future building, but does not believe in converting steamers to Diesel power. But for the existing high costs of construction, an oil-fuel storage barge would already have been laid-down, using the surplus fuel from his motorships to maintain the supply in the barge. Mr. Bröstrom stated that although the new big motor-liner might not be laid-down before next spring, this remarkable vessel will positively be built, but if the costs in Sweden are too high the order may go to Germany.

THE "SULINA"

Regarding the motorship "Sulina" we will repeat her chief dimensions, with corrections accord-

ing to minor changes made while the vessel was under construction—

Deadweight Capacity.....4,537 tons
Cargo Capacity.....239,600 cu. ft. grain
Fuel Capacity.....555 tons oil
Cruising Radius.....27,000 sea-miles
Net Cargo-Capacity (excluding fuel, etc.),
3,850 tons

Daily Fuel-Consumption on trials.....5.1 tons
Power.....1,500-1,750 i.h.p.
Engine-Speed.....80 to 100 R.P.M.
Speed.....12 knots light
No. of Engine-Room Staff.....6 men
Length of Machinery Space.....42 ft.
Fresh Water Carried.....20 tons
Length (B.P.).....299 ft., 6 in.
Breadth (M.D.).....44 ft.
Depth (M.D.).....28 ft., 11 in.
Loaded Draught (Mean).....22 ft., 2 3/4 in.
Engine Bore & Stroke,

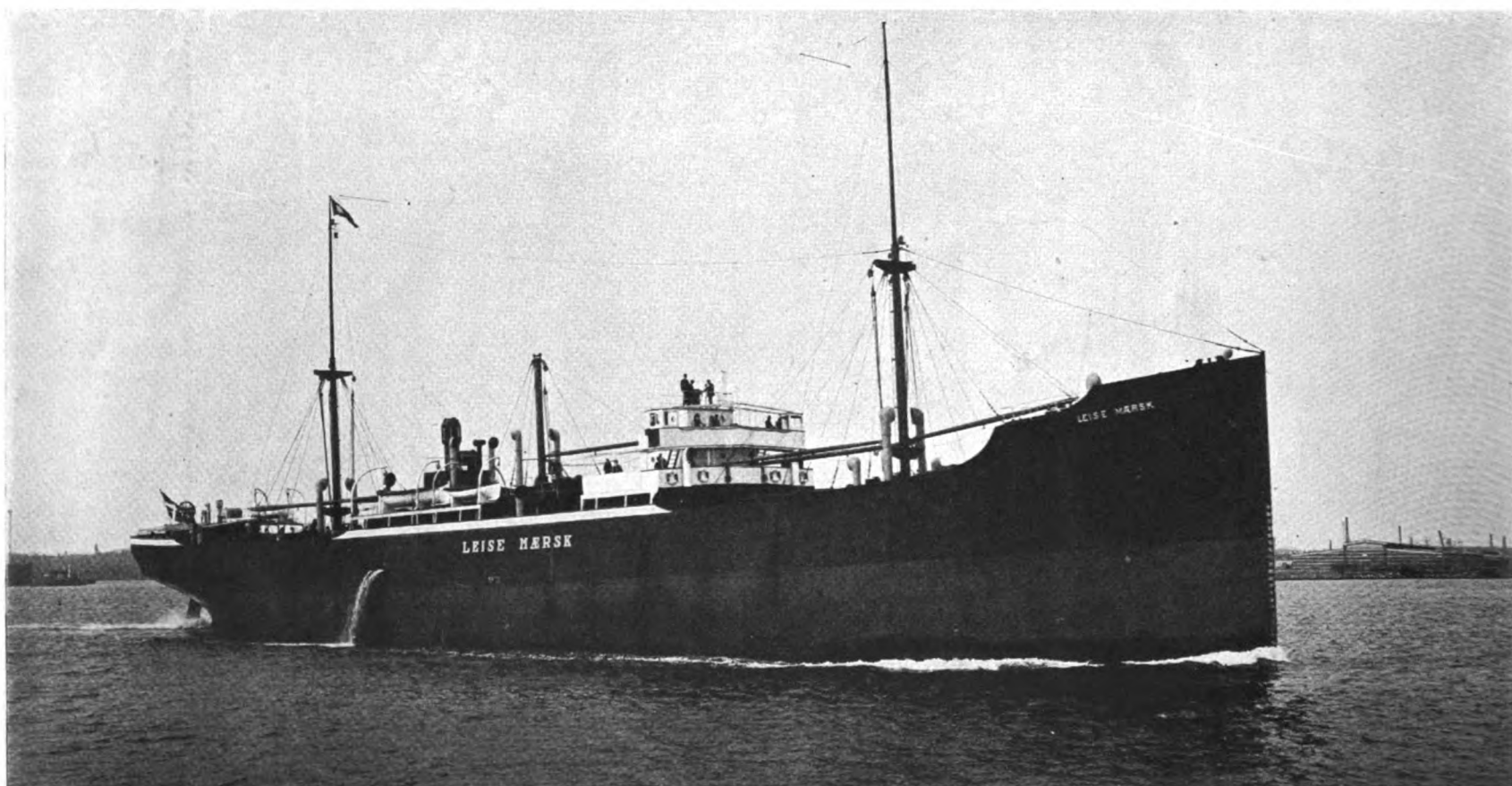
630 mm. (28.80 in.) 1,300 mm. (51.18 in.)
Classification.....Lloyds + 100 A1
Type of auxiliary and Deck Machinery..Electric

On her trials she attained a speed of 12 knots lightly loaded on a fuel-consumption of 5 1/10

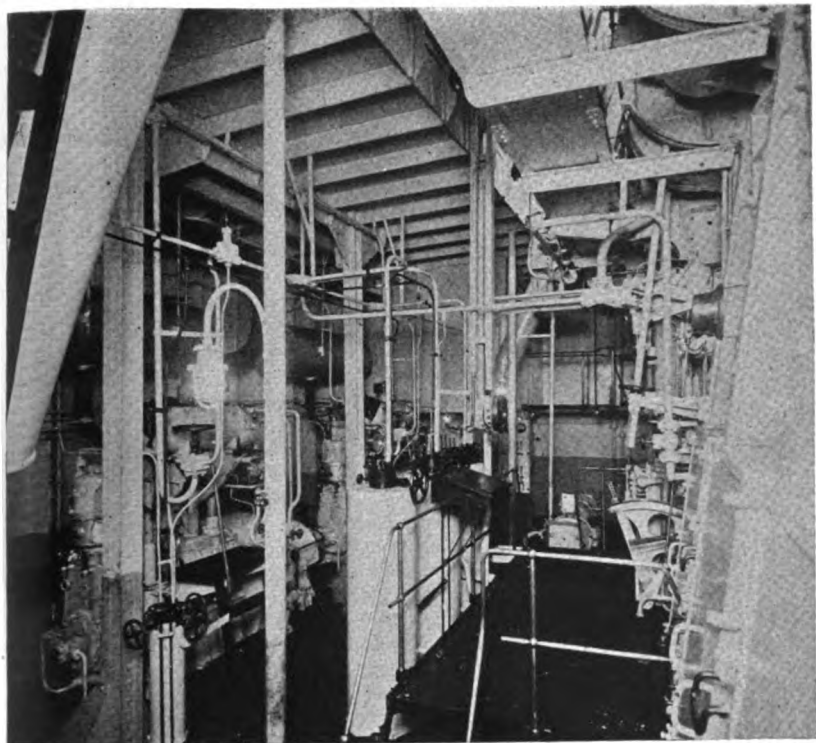
tons per 24 hour day. Her engine was built under B. & W. license by the Götaverken of Göteborg who carried-out the installation work.

Our Danish correspondent advises that when turning at 95 R.P.M. and developing 1,600 i.h.p., a speed of 11 knots was attained on the trial run with a fuel-consumption of 133 grams per i.h.p. hour including all of the machinery. The speed of 12 knots was attained at increased revolutions.

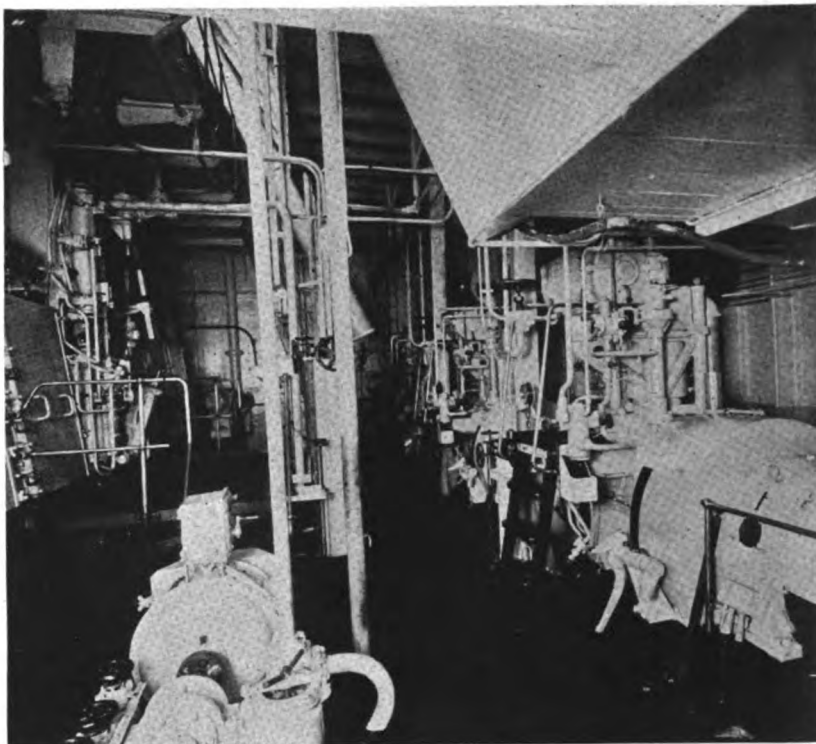
The auxiliaries of the "Sulina" consists of two 75 b.h.p. twin-cylinder Diesel-engines connected to electric generators and one single-cylinder 50 b.h.p. Diesel-electric set of B. & W. design, but built by the Götaverken. The installation of electrical equipment was carried out by the New Luth & Rosen Electric Co., Ltd., of Stockholm. There are ten 3-ton Asea electric winches serving five hatches. Clarke-Chapman electric-windlass and Brown electro-hydraulic steering-gear is installed. There is accommodation for several passengers. The engine-room crew, comprises chief-engineer, 2 asst.-engineers, one junior-engineer and one motorman, or a total of 7 men. But the junior-engineer is only on board as an apprentice, so the regular staff is six men, compared with 15 men for the steamer "St. Thomas"



The new slow-speed, Diesel-engined, single-screw motorship "Leise Maersk" leaving port for her trial



Looking forward in engine-room of the m.s. "Leise Maersk" showing controls on port side of the single 1,600-1,700 i.h.p. main engine



The three auxiliary Diesel-electric generating-sets on the port side of the engine-room of the m.s. "Leise Maersk"

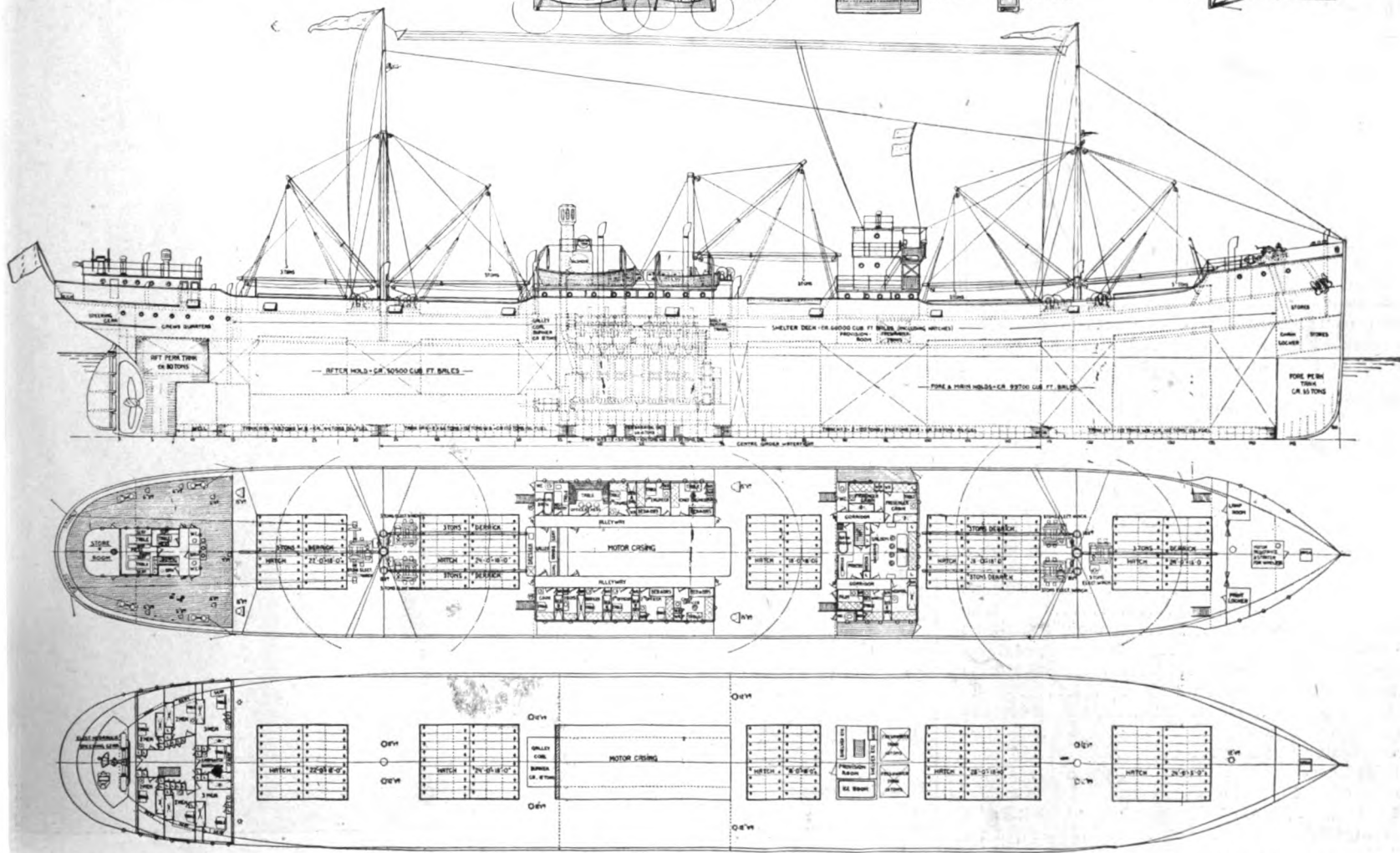
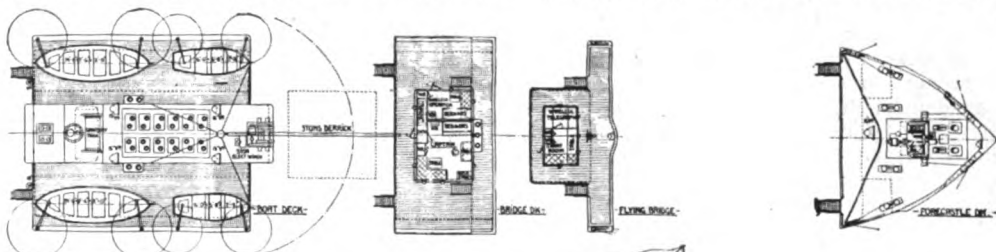
It is interesting to note that the "Sulina's" engine was the first supplied by the Götaverken for a motorship built at a Swedish shipyard other than their own. At the dinner following the launch Mr. Ernst Hedén of the Götaverken referred to the excellent co-operation existing between the engine and hull makers who are competitors in the ship-building industry, particularly as the Landskrona shipyard was formed by Danish interests. Similar pleasant conditions have existed between Götaverken and Burmeister & Wain of Copenhagen, as well as with a number of other yards at home and abroad. Following Mr. Hedén, Mr. Dan Bros-trom paid a high tribute to the great developments made by Burmeister & Wain from the days of

the "Selandia" to the trials of the "Afrika" and to this new single-screw equipment.

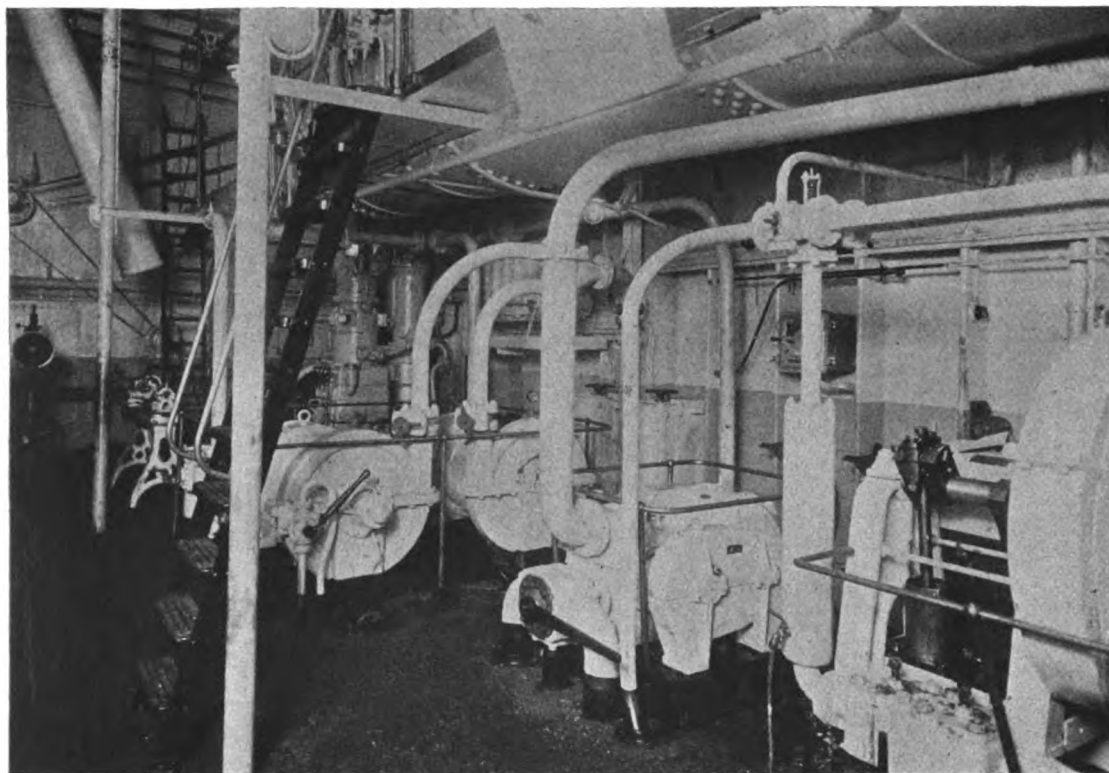
THE "LEISE MAERSK"

We will now turn to the other ship the "Leise Maersk" which is practically the same size and power as the "Sulina." Some very interesting comparisons will soon be available as the same

builders some time ago constructed the steamship "St. Thomas" to the order of the East Asiatic Company of Copenhagen. We believe that this is one of the steam vessels sold by the latter company to the Orient Steamship Company. The "St. Thomas" is a single-screw vessel and her machinery is of practically the same power, con-



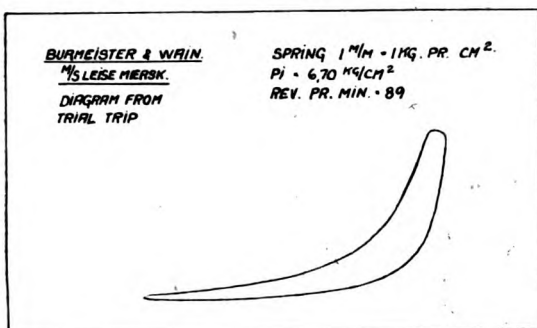
"Leise Maersk" a single-screw motorship of 4,440 tons d.w.c. built by the Odense shipyard for the Svenborg S. S. Co. She is propelled by a 1,600 i.h.p. Burmeister & Wain Diesel-engine turning at 85 R.P.M.



Starboard side of engine-room of m.s. "Leise Maersk" showing electric-driven air-compressor and pumps

sisting of a triple-expansion reciprocating steam-engine and two Scotch boilers. These weigh 337 metric-tons compared with 332 metric-tons for single-crew Diesel-engines of the motorship "Leise Maersk." The Diesel-engine weights include main-engine, shafting, propeller, auxiliary-machinery, floor-plates, gratings, ladders, air-storage bottles, piping, silencers, spare parts and workshop tools. This should silence the critics who state that Diesel machinery is much heavier than steam plants. Incidentally, it may be mentioned that the Burmeister & Wain type Diesel-engine is one of the sturdiest and heaviest on the market so affords a comparison in one sense favorably leaning on the side of the steam-engine. Only 42 ft. is required by Diesel machinery, whereas the engine-

Depth to S. D. 28 ft., 11 in.
Draught Loaded 22 ft., 6 in.
Weight of machinery including all equipment and shafting 337 metric tons
Length of Machinery Space 42 ft.
She is intended for cargo-carrying, but has two



room of the steamer is 44 ft. long and cross bunkers 12 ft., making a total of 56 ft. Thus a saving of 16 ft. of space is effected by the Diesel plant.

It is interesting to note that in connection with the saving in space compared with steam-driven vessels, two additional frames space could have been added to the 7 saved. This was not done because the maximum deduction allowance from the gross tonnage for harbor and channel dues amounts to the 30 per cent. already effected.

We will repeat the main details of the motorship "Leise Maersk" with latest corrections—

Loaded Displacement 6,350 tons
Dead-Weight Capacity 4,440 tons
Net Cargo-Capacity about 3,850 tons
Cargo-Capacity of Holds 210,200 cu. ft. of Bales
Stipulated Sea-Speed 10 1/2 knots
Stipulated Daily Consumption of Fuel 5 tons
Total Fuel and Stores Carried 580 tons
Salt-Water Ballast 135 tons
Fresh-Water Capacity 20 tons
Engine-Speed 80 to 100 R.P.M.
Power of Main-Engine,
1,500—1,750 i.h.p. (1,150 shaft h. p. at 80 R.P.M.)
Length (O.A.) 315 ft., 3 in.
Length (B.P.) 299 ft., 6 in.
Breadth (M.D.) 44 ft.

large staterooms for passengers, in addition to a special cabin for the pilot. For handling the cargo there are seven 3-ton derricks served by seven Thrige electric-winches of the same lifting capacity. In the case of this vessel the engine was designed and constructed by Burmeister & Wain at their Copenhagen yard, and is of the 6-cylinder single-acting four-cycle type developing 1,500 to 1,750 i.h.p. at speeds from 80 to 100 R.P.M. This engine actually developed 1,150 shaft h.p. at 80 R.P.M. on test, the bore and stroke is 630 mm. by 1,300 mm. respectively. Winches, steering-gear, anchor-windlass are electric-driven. A current of 220 volts is supplied by three single-cylinder Burmeister & Wain Diesel-engines of 50 b.h.p. each, coupled to generators, of which only one needs to be used when the vessel is at sea, including for the lighting. For heating the ship there is a small vertical oil-fired boiler of 55 sq. ft. heating-surface.

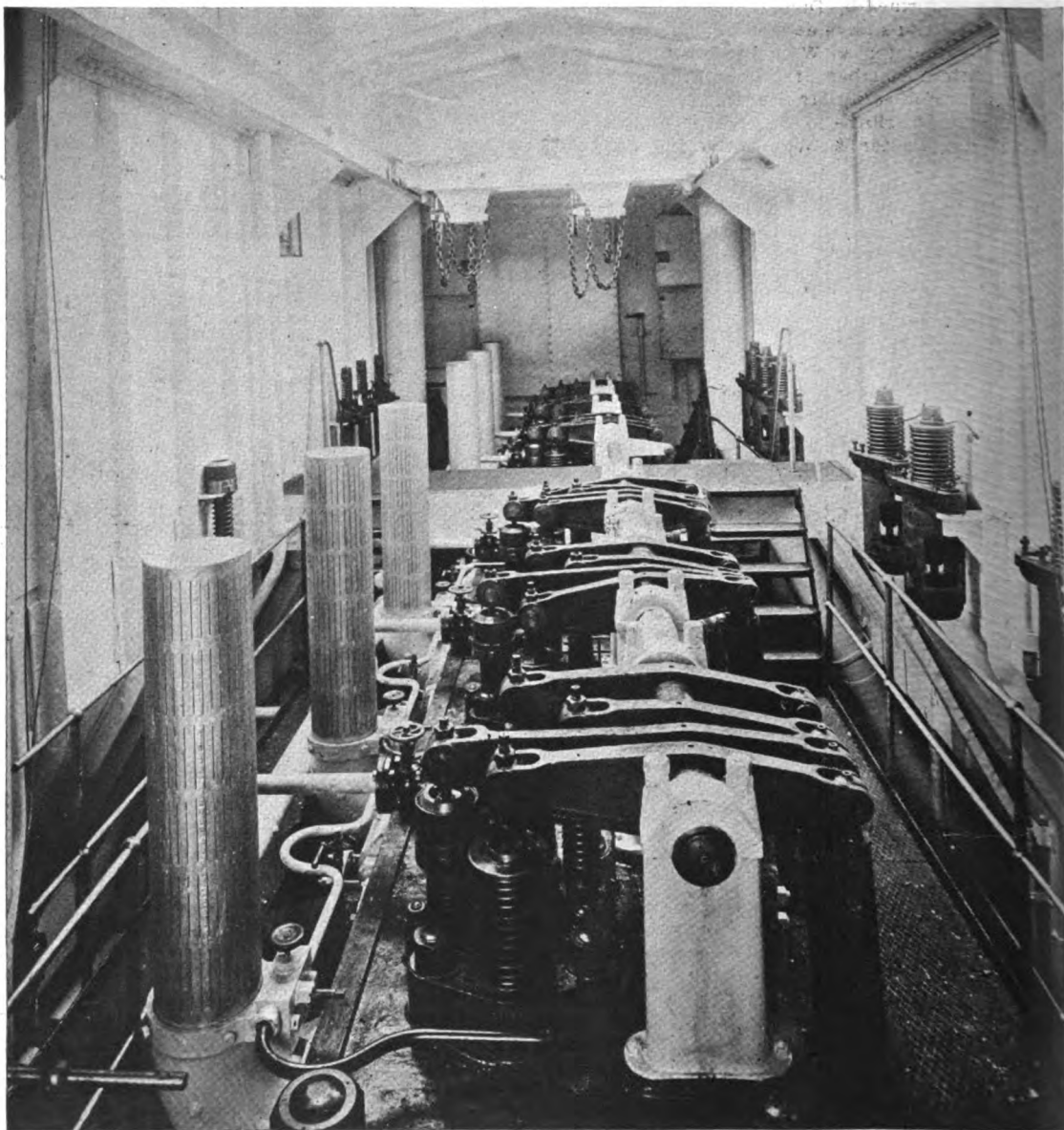
The engine-room and boiler staff consists of 9 men, represented by 3 engineers, two junior engineers, three motormen and one electrician.

As regards lubricating-oil, the total requirements for all machinery amounts to 8 3/4 gallons per day including the hand lubricating-oil and waste-oil in tanks. It is usual with Burmeister & Wain engines to adopt the Aspinall Governor, but we understand that on this particular engine a governor of Burmeister & Wain's own design is fitted, which cuts off the fuel instantly, the revolutions rise above the pre-determined limit.

For comparison purposes the dimensions of the steamer "St. Thomas" are—

Displacement 5,180 tons
Deadweight Capacity 3,750 tons
Bunker and Boiler-Water Capacity 985 tons
Daily Fuel-Consumption about 25 tons
Net-Cargo Capacity* about 2,765 tons

*As the steamer's bunker capacity is only 525 tons her cruising radius with 2,765 tons of net-cargo is only about one-third of the radius of the motorship with 3,850 tons of net-cargo.



View of engine-room of the m.s. "Leise Maersk" looking down on cylinder heads. Note the new cylinder-beam construction and off-set fuel-injection valve.

Length (B.P.) 311 ft.
 Breadth (M.D.) 40 ft., 6 in.
 Depth (to U.D.) 21 ft., 9 in.
 Draught, Loaded 19 ft., 7 in.
 Speed 11 knots
 Cylinders 21½ in. x 34½ in. x 60 in.

39

Engine and Propeller Speed 80 R.P.M.
 Weight of Machinery 337 metric tons
 Length of Machinery and Bunker Space 56 ft.
 Engine-room Crew 15 men

As previously mentioned, the first details of the new Burmeister & Wain-Götaverken engine were published in our issue of March, 1921, but we will repeat a few principal details as follows:

The dimensions are I.H.P. 1,750; shaft h.p. cylinder diameter 630 mm.; (24.803 in.) stroke 1,300 mm.; (51.181 in.) revolutions 100; length from aft coupling to front of compressor 10,500 mm.; height from center of crankshaft to top of valves 6600 mm.

The most interesting features of this new engine are the cylinder-head and cylinder liner. The heads are nearly square and are supported by distance pieces which stand on the "A" frames. The heads are bolted together, three and three. Long bolts pass from the main frame, thro the "A" frames and distance pieces, and between the heads, each nut pressing down on two heads. The long bolts also have nuts at the top of the "A" frames. The liners are bolted directly to the head, without any packing, iron to iron. Outside the liner, bolted to the head with a gasket is the water-jacket, which packs off against the liner near the lower end with a rubber ring. This allows the liner perfect freedom to expand. The inner shell of the cylinder-head is well braced by four stays. The cooling-water enters at the lower end of the jacket and most of it is made to pass into the cylinder-head at the opposite side by a baffle-ring inside the jacket. The water-space in the head is very large, insuring effective cooling around all valves.

In order that the removal of the piston downward instead of by removing the head, may not be too complicated, it has been made oil-cooled instead of water-cooled.

To remove the piston, it is brought almost to

top center, the crosshead shoe is blocked-up, the crosshead bearings taken apart, and the connecting-rod lowered by turning the crank almost to bottom center while lowering the upper end of the connecting-rod with a chain hoist, so that it rests on the outboard side of the main frame. The outlet and inlet valves are removed, eyebolts screwed into the piston-head, and the piston is lowered through the top plate so that the crosshead pin rests on beams placed across the main frame. It can then be inspected or even removed. The top plate differs from the ordinary construction in that it has a hole large enough to permit passage of the piston, this hole being closed by two semi-circular plates, which contain a scraping for the piston rod.

The frame for the gear-train stands in the center but is separate from the "A" frames. The three fore and the three aft cylinder heads are bolted together with horizontal bolts. This construction allows the engine to weave slightly, too great rigidity having been found detrimental.

The main frame and "A" frame are largely of "I" section. The air-compressor is of the latest Burmeister and Wain three-stage design, directly connected to the crank-shaft at its forward end, having its own base frame bolted to the main frame, though its "A" frame and cylinders stand free. Other parts of the motor are in general Burmeister and Wain standard, with such small refinements as experience has made desirable.

One new feature of this engine not previously discussed takes the form of a metric scale and hand-control wheel regulating the clearance or varying the lift of the fuel-valves, enabling the engine to run at very slow-speed.

Both the "Sulina" and the "Leise Maersk" are fitted with the Kockum air-siren, which is about to be introduced on the American market by A. O. Anderson and Co., of New York.

Immediately after her trial run the "Leise Maersk" loaded and started on her maiden-voyage carrying a cargo of Portland cement from Arhus to Java. Mr. A. P. Möller, managing-director of the owners said that in spite of the present low freight rates, the vessel was sufficiently economical to earn profits. But, he considers the price quoted by oil-companies too high even in the districts of oil production.

On the trials runs of the "Leise Maersk" four runs were made, the ship if light having a displacement of 2,240 tons and a mean draught of 8 ft., 2½ in. An average of 1,665 h.p. at 91.9 R.P.M. was made with the ship averaging 11.71 knots. Over the measured mile, however, a speed of 12.6 knots was attained with the engines developing 1,710 i.h.p. at 92 R.P.M. During the fuel-consumption tests the engines developed 1,565 i.h.p. at 88.9 R.P.M. with a fuel-consumption of 0.1,265 kg. per i.h.p. hour. The heating value of the oil was 18,350 B.T.U. In operation the engines of the "Leise Maersk" will be run at a slower speed than the engines of the "Sulina" and only 1,500 i.h.p. will be developed at 85 R.P.M.

Before concluding this article we will also refer to another single-screw motorship, but a little smaller in size and building at the Eriksberg shipyard at Göteborg in which an engine of the same power and slow-speed is being installed by the Gotaverken of the same city. This vessel is also to the order of the Swedish Lloyd, for whom the New York agents are Moore & McCormack. Drawings and details of this vessel were given in our issue of March, 1921, pages 218-219. At the same time drawings were given of the sister steamship "Hibernia" also built at this yard for the Swedish Lloyd. Comparisons have been made, which show that the motorship had an additional underdeck cargo-capacity of 13,470 cu. ft. of grain, when loaded with fuel sufficient for a voyage 500 miles longer than the cruising radius of the steamer. Also, there was a saving of 20 ft.-3 in. in machinery space in favor of Diesel-drive. If, however, the "Hibernia" was converted to oil-fired instead of coal, the machinery space would not be so great, but would be 12 ft. which is quite considerable with a ship of her small size.

We have omitted to repeat the fact that both the Swedish Lloyd's motorship built at Eriksberg and the steamship "Hibernia" are of 3,750 tons d.w., but their net cargo-capacity on a round Transatlantic voyage are 3,425 and 3,000 tons respectively. The "Hibernia" has a daily fuel-consumption of 22 tons of coal, whereas the motorship has only a consumption of between 5 and 5½ tons, or a daily saving of 16 tons.

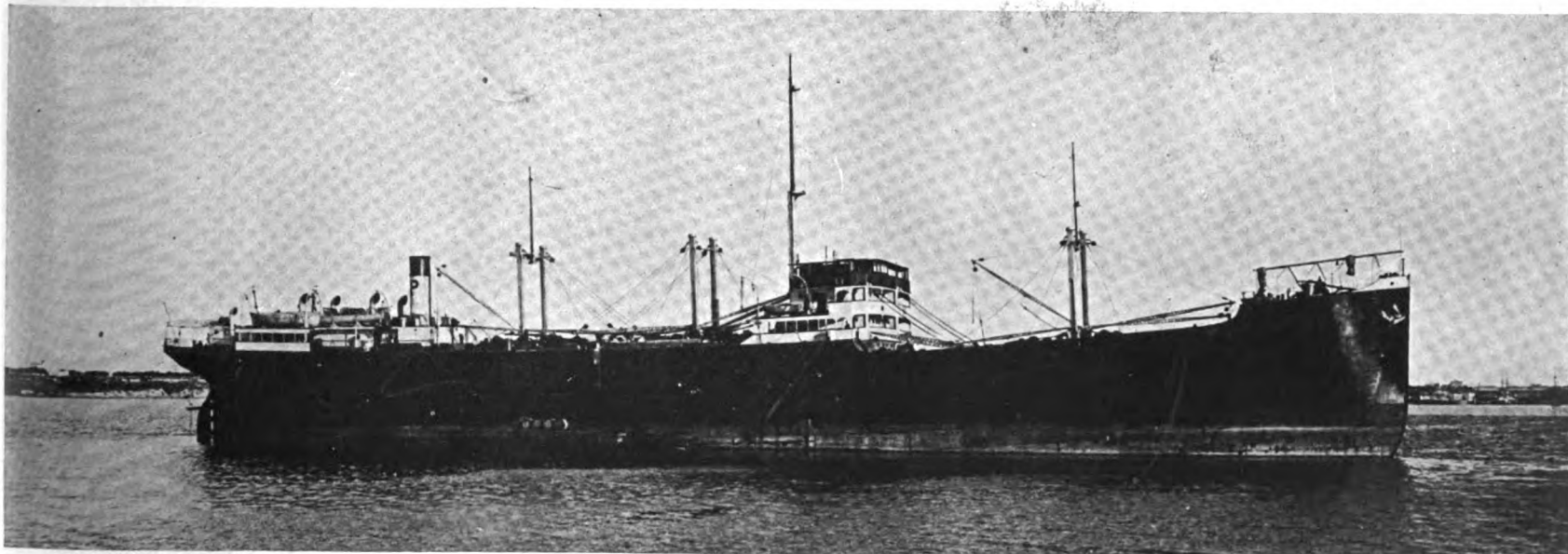
New Italian Motorships "Ardito" and "Primula"

DURING the last year or so not very much has been heard of the Tosi Diesel-engine, the builders having dropped more or less out of the American limelight following the war, during which period they built some very excellent submarine engines, as well as the Diesel-engines for several naval tankers. Two American shipyards secured licenses to build the Tosi engine, but the shipbuilding slump came before they had time to construct any commercial installations. Nevertheless, work has been progressing steadily at the works in Italy of the Franco Tosi

Two Vessels with the Latest Design of Tosi Diesel-Engine—Excellent Performance on Maiden Voyage of the "Ardito"

Co. Also work is progressing on the British-built Tosi engines for two fruit-carrying motorships under construction at Wm. Beardmore's yard at Dalmuir, Scotland, which have been described in "Motorship."

Two large Italian-built motorships recently ran their sea-trials, and one of them has just completed her maiden voyage. This is the "Ardito," a freighter of 8,000 tons deadweight, owned by the La Platense Shipping Co. of Genoa, and built at the Taranto Shipyard of the Tosi Company. She is propelled by two four-cycle, single-acting, Tosi Diesel-engines constructed at their Milan plant. This pair of oil-engines was installed in the ship without any shop trials. When the vessel was completed the ship's sea-trials were run, and the "Ardito" proceeded in ballast for England, without



New Italian 8,000 tons motorship "Ardito," which averaged 12½ knots on her maiden voyage in heavy weather. Her twin 1,250 shaft h.p. Tosi Diesel-engines were installed in the ship without factory tests. Fuel-consumption 9¼ tons per day

dismantling a single main item and without any alteration.

From Spezia to the Barry Docks, she averaged $12\frac{1}{2}$ knots on $9\frac{1}{4}$ tons of fuel-oil per day, although heavy weather was encountered en route. As the engines operated continuously at 2,800 i.h.p. together, this consumption works-out at 0.31 lb. per indicated h.p. hour.

Only two involuntary stoppages of the main engines occurred during the voyage, one to tighten-up a bottom-end bearing on one engine. The other was due to defective inlet and exhaust valve springs on one cylinder, in which case the valve-tappet was screwed-back, and this valve put out of action. This cylinder thereafter operated with one inlet and exhaust valve without any material reduction in the power obtained. This was made possible because of the ample exhaust and inlet area throughout the valves allowed in this particular valve design.

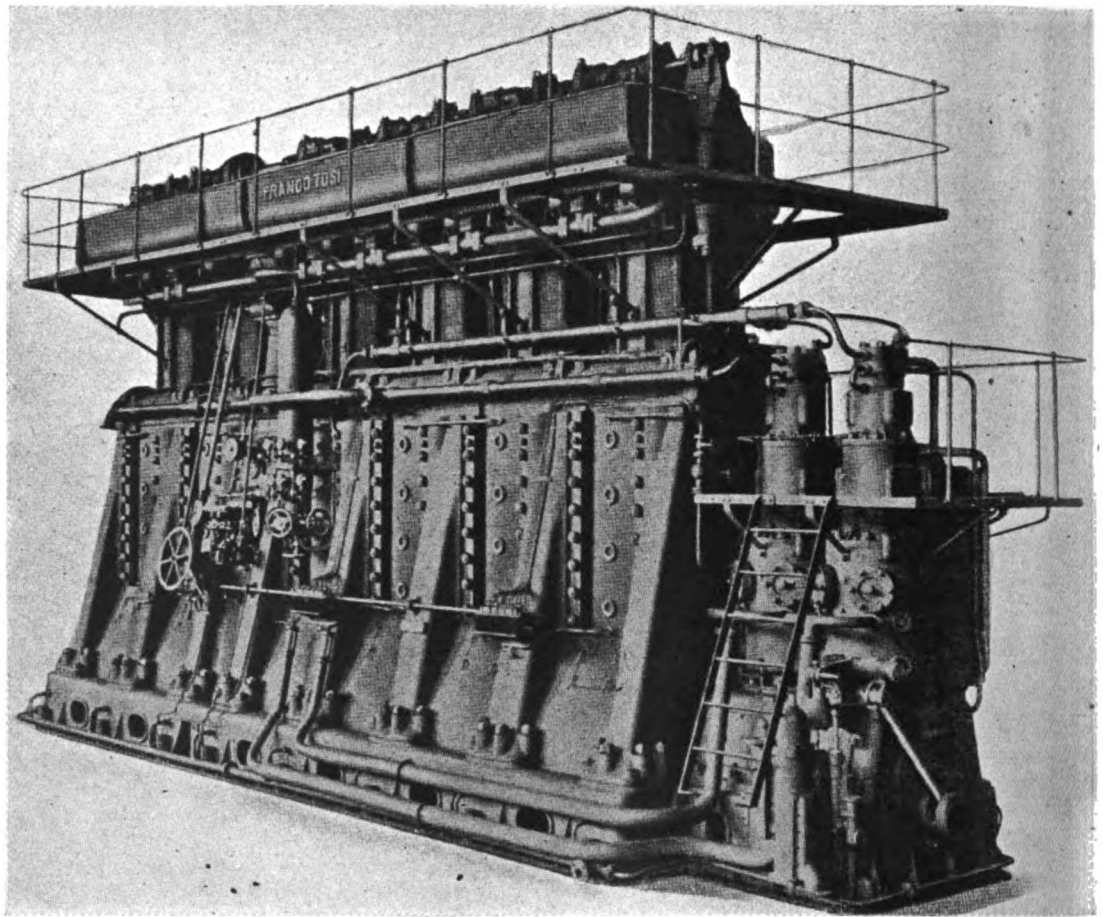
On the arrival of the vessel at Barry it was found unnecessary to dismantle any of the parts of the main engines, but one "director-valve" was removed for inspection. It was most gratifying for the engineers to find that practically no deposit of carbon was to be seen. Manoeuvring of the engine was all that could be desired, any required speed from 125 r.p.m. down to 38 r.p.m. being easily obtained by manipulation of the fuel-lever, and reversal from full-ahead to full-astern was carried-out as easily as with steam machinery.

Description of the "Ardito's" Machinery

As we close for press the dimensions of the "Ardito" are not available; other than that she is of 8,000 tons deadweight capacity, but engine-room plans of a Tosi motorship of this tonnage were published on page 121 of "Motorship" for February, 1920. However, each of the engines is a six-cylinder model with 620 mm. (24.409 in.) bore by 975 mm. (38.385 in.) stroke, and operates at 125 r.p.m., at which speed the rated power is 1,250 shaft h.p. But on the sea-trials of the ship, the starboard engine developed 1,290 shaft h.p. (1,718 i.h.p.) at 115 r.p.m., and the port engine 1,280 i.h.p. (1,704) at 114 r.p.m., giving the vessel a speed of 12 knots. The exhaust was invisible, and there was an absence of vibration in all parts of the ship.

The following is an extract from the said sea trials:

	Port-Engine	Starboard-Engine
Indicated Horse-Power.....	1,704	1,718
B. H. P.....	1,280	1,290

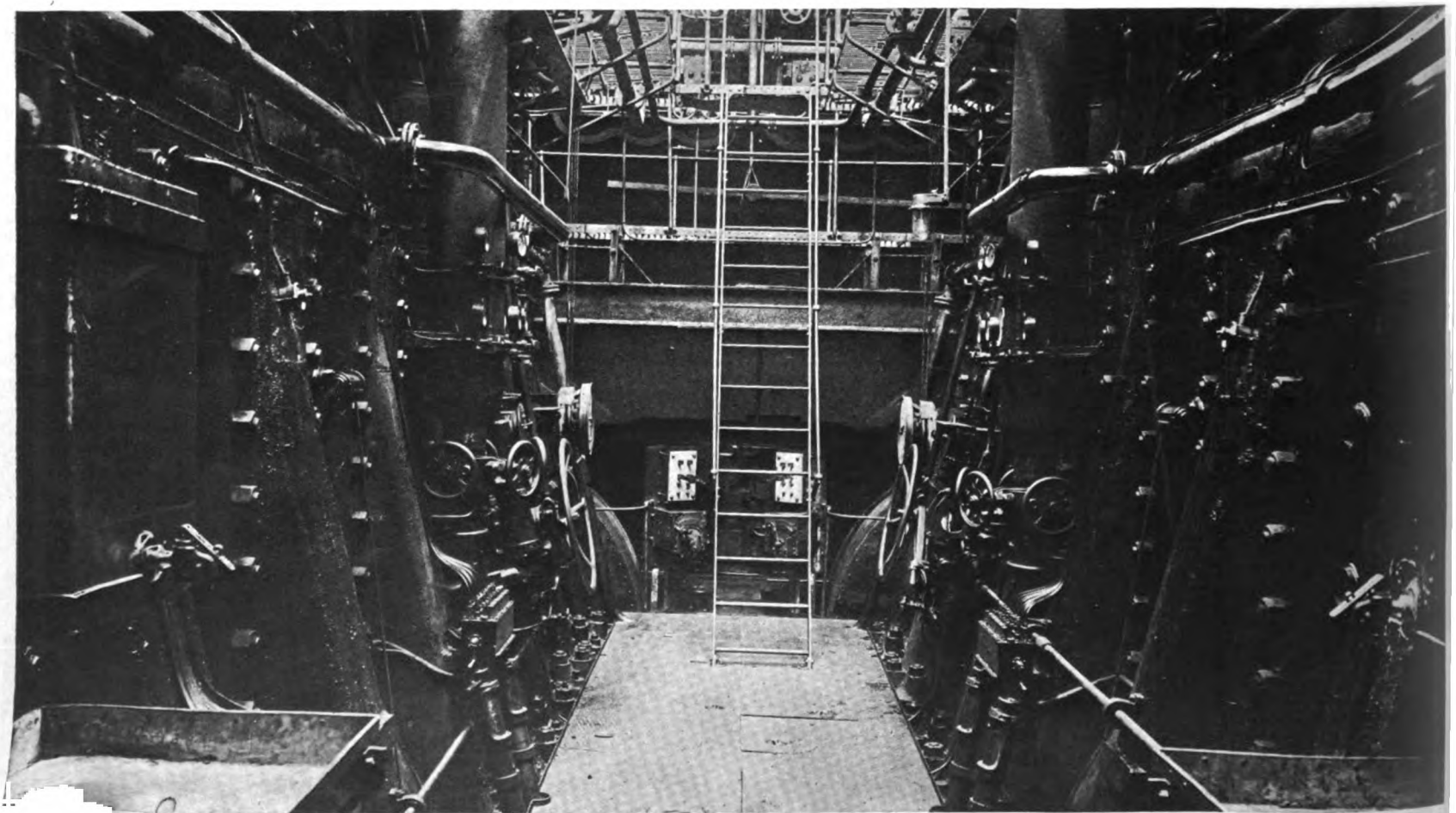


One of the newly-designed twin 1,250 shaft h.p. Tosi Diesel-engines of the m. s. "Ardito"

Mean Pressure.....	109 lbs. sq. in.	110 lbs. sq. in.
Revs. per minute.....	114	115
Fuel consumption per B.H.P. hour.....	0.43 lb.	0.43 lb.
Mean compression.....	470 lbs. sq. in.	470 lbs. sq. in.
Mean firing pressure.....	500	520
Injection-air pressure.....	1,000	990
Pressures—		
Circ. water system.....	10 lbs. sq. in.	9.75 lbs. sq. in.
Lub. oil system.....	7.5	7
Piston-cooling system.....	23	24.4
Temperatures—		
Circ. water outlet.....	42° C.	44° C.
Piston-water outlet.....	50° C.	52° C.
Exhaust Gases.....	212° C.	215° C.

While this new Tosi engine works upon the established four-stroke cycle, it embodies in its

design and construction a number of special features of more than passing interest. The six cylinders of the engines are divided up into two groups, one of four cylinders and one of two cylinders, the latter being at the after end of the engine. This arrangement facilitates the removal in the ship for inspection or any other purpose, of the after length of the crankshaft. The vertical shaft for operating the valve camshaft is driven-off the crankshaft by spiral gears; the horizontal camshaft running along the tops of the cylinders and quite clear of the cylinder heads. The spiral



Control-floor of engine-room of the motorship "Ardito" looking aft between the two main Diesel-engines

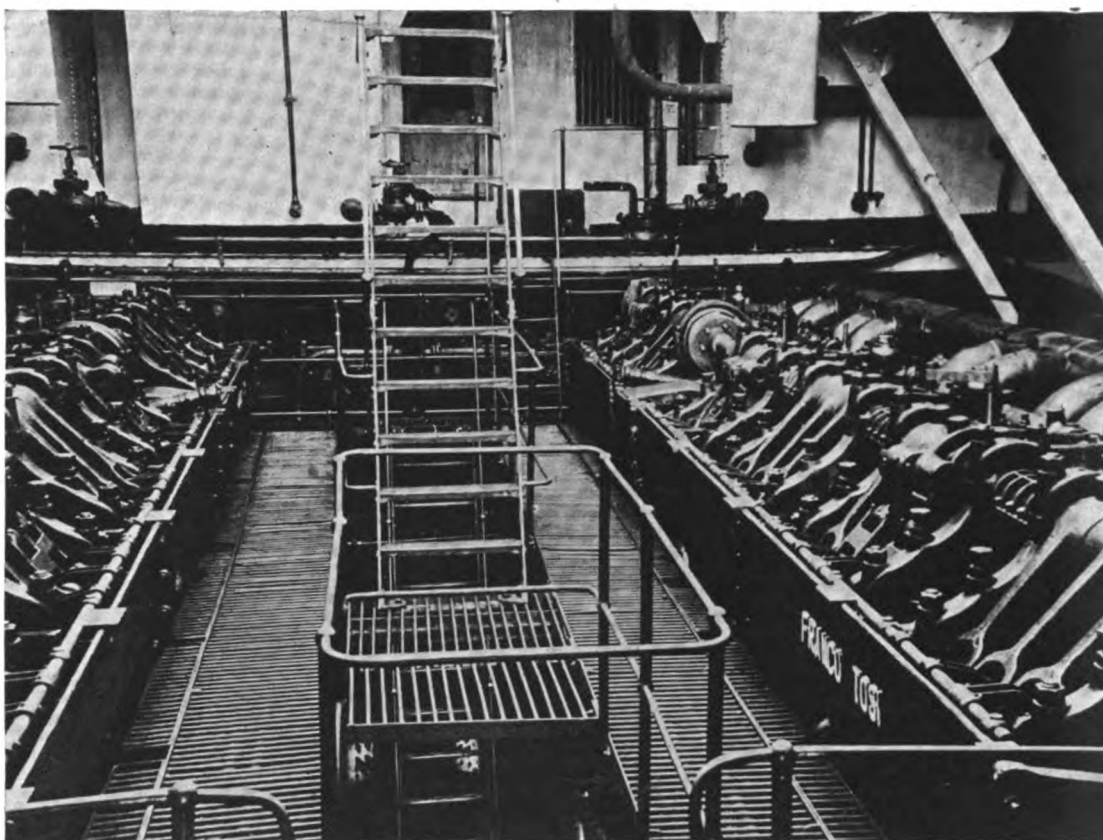
wheel on the crankshaft is mounted on the coupling between the two shafts in the usual way. These spiral wheels have specially formed teeth, making for easy engagement, and are produced by Messrs. Tosi in their own shops. The engine is totally enclosed, as is now standard practice, to permit of forced lubrication. Below each cylinder is the usual diaphragm containing a gland for the piston-rod to prevent contamination of the crank-chamber oil by any carbonized oil falling from the pistons. A feature unusual with merchant-ship engines, but found in some submarine motors, is that the induction-air for the working-cycle is drawn from the space underneath the main pistons. Any leakage of combustion gases past the main piston-rings is therefore drawn away and prevented from vitiating the engine-room atmosphere. Access to the underside of the pistons is obtained through doors at the back of the engine.

Each cylinder-head contains the usual valves for starting air, fuel admission, relief, and inlet and exhaust. The inlet and exhaust-valves are of much smaller size than normal, since both serve for the phase of inlet, and both for the exhaust. This is an unusual arrangement, and is made possible by the provision of a "director," or oscillating flap-valve, situated in the cylinder-head at the back of these valves, driven from the camshaft by an eccentric and rod. This flap-valve serves to direct the air to these two poppet-valves on the inlet stroke, and to direct the combustion-gases from these valves to the exhaust-manifold on the exhaust stroke. The fact that these valves are much smaller than usual permits of a stronger cylinder-head and of better cooling around all the valve seats, as well as reducing the noise and wear of the valve-gear, since the inertia effects are minimized in proportion as the weight is lessened. These valves are opened and shut once per cycle of two revolutions, so that on the conclusion of the exhaust-stroke the valves are immediately cooled by the rush of air drawn over them by the downwards moving main piston, which air current also serves to sweep any carbon from the valve face. This arrangement is claimed by the designers to make conditions of working of these valves more favorable than has ever before been the case, as well as giving advantages by way of reducing to a minimum uneven temperature stressing of the cylinder-head itself.

The design of the fuel-injection valve also calls for special mention, as it has no packing. The needle-valve itself is operated through an internal lever pivoted on a fulcrum. This lever serves to reverse the direction of motion to give an outwardly opening fuel-valve in the usual way, and it is operated by a small ground-plunger, the bottom of which acts as a valve. Its remoteness from the fuel precludes the leakage of oil, and in any case air can only leak for some 40 deg. out of the 720 deg. of the cycle, instead of the possibility of air and fuel leaking continuously, as may be and sometimes is the case with the normal design. In operation it is found that no air whatsoever leaks, the ground-plunger being quite effective in preventing this, and the advantage of having no gland, which is often too tightly packed, thus causing the needle to hang up with consequent burning of the valve, etc., is an important one.

There are two 3-stage fuel-injection air-compressors at the forward end of the main engine. Either of these machines is sufficient to supply the air for one main-engine; both serve when manoeuvring to recharge the depleted starting air-reservoirs.

Reversing entails two cams for the fuel, starting-air, and combined inlet and exhaust valves in each cylinder-head. The director flap-valve does not require to be reversed. Instead of moving the camshaft bodily fore and aft, as with some



Upper platform of engine-room of motorship "Ardito," showing valve-operating mechanism

engines, the cam-rollers only are moved, to register either with the ahead or astern cam; the jaws of the valve-levers being widened out to permit this. A light lay-shaft directs this movement of the rollers, and this is operated by a lever movement worked by hand from the manoeuvring platform.

The manoeuvring-gear is of the "all round" pattern, and is operated by either hand or power. Starting-air, injection-air and fuel are automatically cut in or out when starting or stopping; suitable locking-gear is also provided for the reversing gear, etc. The fuel-pump is placed close to the manoeuvring platform and has a separate plunger for each working-cylinder.

The auxiliary machinery in the engine-room is principally electrically driven. Two auxiliary Diesel-dynamo sets each of 120 b.h.p. supply the necessary current. For manoeuvring purposes, etc., a twin electric motor-driven auxiliary air-compressor is installed; whilst as an emergency compressor a small steam-driven unit is fitted. Two circulating-water pumps each of 110 tons per hour, and two lubricating-oil pumps, both electrically driven, supply the main engines, one of each being a "stand-by" pump. The fuel-service pump, also a 40-ton bilge-pump, are driven off the end of the crankshaft; the "stand-by" pump for fuel service being of the semi-rotary hand type. Electric heaters are also used for warming the cabins and living quarters. Two small donkey boilers supply the steam for the deck winches, the steam-driven emergency compressor before mentioned, and a pump for filling the bunkers with fuel.

DESCRIPTION OF THE "PRIMULA"

As regards the smaller Tosi Diesel-engined ship, she is named the "Primula" and is of 3,600 tons d.w.c. Her owner is Edward Mazza, of Savona, Italy, and she was built by the Cantieri G. A. F. Migliardi, also of Savona. She is distinctive as being the first Diesel-engined freighter constructed in Italy on the Isherwood system of hull construc-

tion. Her engines differ from the engines of the "Ardito" in that they were built to the design of the Tosi cross-head engine previously described in "Motorship" and were constructed at the Legnano plant of Franco Tosi. Two 6-cylinder engines of the four-cycle type having 430 mm (16.929 in.) bore by 670 mm (26.378 in.) stroke are installed. Each develops 500 shaft h.p. at 165 R.M.P., or 600 shaft h.p. at 180 R.P.M., giving a total of 1,000 to 1,200 shaft h.p. to propel the ship.

The dimensions of the "Primula" are as follows: Deadweight-capacity 3,600 tons. Length (B.P.) 290 ft. Breadth 41 ft. 4 in. Depth 19 ft. Power 1,200 shaft h.p. Trial Speed 12 knots

Similar to the "Ardito" her propelling-machinery is placed aft following the practice of many other Italian motorships. Also, the auxiliary equipment is chiefly steam-driven—two Cockran boilers being installed in a compartment abaft the engine-room. Condensing plant for the steam-driven equipment is installed in the engine-room. Fuel-tanks of the ship have a capacity of 135 tons, while 7½ tons of lubricating oil can be carried.

On trials of the ship a speed of 12-knots was attained at 180 R. P. M., while reversing of the engines from full-ahead to full-astern was carried out in twelve seconds. Complete freedom from vibration and clean exhaust were features of the trials.

As is well-known to readers of "Motorship" many Diesel-engined merchant-vessels have been completed by Ansaldo-San-Giorgio for Italian ship-owners and a considerable number are still under construction. So the advent of these Tosi engined ships will be of quite a little importance. The bid now being made by Italy for her just share of the world's ocean-freightage is well known. In doing so she has wisely adopted the economical heavy-oil burning, internal-combustion engines for the propulsion of her ships.

PROPOSED 20,000 TONS WORLD TRADE-EXHIBIT MOTORSHIP FOR GREAT BRITAIN

Big Twin-Screw Diesel-driven Vessel

Apropos of the project of the Anderson Overseas Corporation of New York, to send the steam-driven liner "St. Louis" on a World Trade Cruise as a U. S. manufacturers-exhibit ship, plans have been gotten-out in England by British Trade Ship Ltd. to specially build a 20,000 tons-gross Diesel-engined motorship and send her on an eighteen

months cruise of 43,000 nautical-miles to 34 important trade centres. Twin eight-cylinder Diesel engines will be installed aft, allowing the major part of the hull to be given over to the exhibit.

It is expected that she will sail from the River Thames in the summer of 1923, and after 358 days will sail for her home port. Four decks will be devoted to the exhibition proper. On the other decks, besides the numerous cabins set apart for the trade representatives who will undertake the journey, there will be provided a large reception hall, offices, an inquiry bureau, a bank, an in-

surance-office, interpreters' offices, telephone-exchange, writing-rooms, a restaurant, a cinema for exhibition purposes, a library and other rooms.

The ship, which will be named "British Trader" has been designed by Swan, Hunter & Wigham Richardson Ltd. of Newcastle-on-Tyne, Sir G. B. Hunter being vice-president of the operating company. Among the directors are the Duke of Northumberland, Commander R. W. Day, Major G. P. Denton, Sir Maxwell Hicks, Messrs. J. W. Beaumont Pease, Noel E. Peck, T. E. Thirlaway, and Edmund Hill.

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MOTORSHIP

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THE DIFFERENCE

Many years ago the old British steamship-building firm of Yarrow Ltd., acquired a license to build Diesel-engines, but they did little more than carry-out some experimental work. Almost simultaneously with their recent announcement that they will completely shut-down their big Clyde shipyard on November 1st came the news that an order has been placed with the Tyne Iron Shipbuilding Co. of Newcastle, for a 10,350 tons d. w. Werkspoor Diesel-driven motorship. (See our last issue.) This is a significant indication of the trend of the times. Shipbuilders must advocate the economical oil-engine or go under!

THE SHIPPING BOARD AND MOTORSHIPS.

"Almost daily the Shipping Board is in conference and the question of Diesel-engines and Diesel-electric drive for ships in the American Merchant Marine is discussed at nearly every meeting," said one of the Commissioners of the Board to a MOTORSHIP representative during a recent interview. The Commissioner in question furthermore stated that he was almost daily in conference with engineers from the various Diesel-engine building companies, as well as with engineers or firms constructing electric-drive, and to all these men the Board has given problems to solve. One firm of Diesel-engine builders had completed their work and the only objection was the question of price. Our representative was given to understand that the Board is prepared to instal the type of engine which will prove the most economical in operation, and the data upon which they will form their opinion is now being prepared. "Operating results of the 'Eclipse' equipped with turbine-electric drive," said the Commissioner, "are now in the hands of the Board, and will be compared with the Diesel motorship 'William Penn' after she has completed her first voyage, the Board being very pleased with the results of the trials of the 'William Penn.'"

Surely the time has arrived for more action and less discussion. For four years the Board has been considering Diesel power, but nothing of note has been accomplished to date. There is absolutely no need to wait for the results of the maiden-voyage of the "William Penn," which is a long-distance one and will take nearly six months. Operating records of motorships, which are practically duplicates of the "William Penn" are available in our pages and elsewhere and are now a matter of common knowledge. To wait for the Board's motorship to return to the Far East is a waste of valuable time and seems to afford an opportunity to the Board of making another delay in carrying-out a businesslike motorship program. What is the matter with the complete report of the Far East voyage of the motorship "George Washington" made by the Board's own engineer, but pigeonholed because in its plain discussion of the facts it showed overwhelming advantages in favor of Diesel-drive compared with steam? Chairman Lasker could refer to this excellent report. Does the Board also know that there are 63 motorships aggregating 191,290 h.p. in service fitted with exactly the same design of Diesel-engine as installed in the "William Penn"? Some Diesel-engines for 5,000 tons ships were built by the Board two years ago. Several of these sets have been purchased by private shipowners from the Board and have given splendid service. Why is the Board making no use of the balance of these engines? Is the Board waiting for the "William Penn" to return from the Far East?

When the Shipping Board started its new fiscal year on July 1, the ship-construction program was about 90 per cent completed. On that date, the shipbuilding position was as follows:

	No.	Deadweight tons
Keels to be laid	0	0
Ships on ways	4	48,000
Ships outfitting	20	228,800
Ships delivered	2,288	13,359,911

Of the foregoing total of 2,288 ships aggregating nearly thirteen-and-a-half million tons, but one vessel is a Diesel motorship and she has just started on her six months' maiden voyage. To think that there is but a solitary motorship in all this fleet and that the Board proposes to wait until her return before deciding what they shall do! To be candid, the matter is a national disgrace and, as stated above, it is time discussions were stopped and definite action taken. Conversions and scrapping of existing steamships must be done now while they are not needed in service, and while our shipyards are closing-down for want of work.

FOREIGN MOTORSHIPS UNDER-CUTTING U. S. STEAMERS FOR AMERICAN CARGOES

As forecasted in MOTORSHIP, the under-cutting in the rates for carrying American freight has been begun by foreign motorships. From many recent instances the following may be quoted, which information was given us by a firm in New York who lost-out, as their bid was too high—although lower than others. During the middle of September the freight rates from Hampton Roads to Rio de Janeiro were quoted at \$3.50 to \$3.70 per ton. But the Danish Diesel-driven motorship "California" was fixed for 9,000 tons of coal at \$3.25, under-cutting all U. S. steamer bids. Although steamships can generally be fixed slightly below the market quotation, a cut of this extent is very unusual to-day. Because of her very low operating-costs due to economical Diesel power, the motorship "California" will carry this cargo at a profit, and doubtless will take a cargo of grain from the Argentine back to Europe.

VERBUM SAT SAPIENTI

A contemporary devoted chiefly to general shipping and noted for its outspokenness, namely, "Nauticus", comments upon the lack of adequate advertising by the American shipping industry, and in its issue of August 27th says:

"One of the great sins of omission in connection with American shipping is the failure to understand the value of advertising. Manufacturers of headache pills and ladies' garters have made the world believe that Americans are great advertisers. However, compare what is being done by European shipping and engineering firms in the line of advertising with similar efforts by their American competitors and it will be seen that the advantage is with the Europeans who are thus able to creat a bias in their favor amongst the international public to whom their names are almost household words."

We concord with "Nauticus" to the extent that at least part of American shipping fails to appreciate and understand the true value of advertising in its various forms. One day shipbuilders, shipowners, engine-builders, oil companies and marine equipment manufacturers will realize the imperative of supporting the leading domestic marine publications and co-operating with them in their efforts to keep the American flag on the High Seas. Advertising plays its part in this.

Take the conditions of to-day. Shipbuilding, marine-engineering, ship-operating and fuel-oil marketing all over the World are passing through a period of business re-action previously unknown in these four allied industries. Yet, in their own markets as well as in this market the shipping industries of the other Hemisphere are advertising to a far greater extent than they did before and during the war and immediately following the War, knowing that shipowners now have time to study their publicity, and that prestige must be maintained during slack periods.

If American firms continue to eliminate proper publicity while a number of important British and other European firms are far more active, what can they expect when shipowners once more are in the market for propelling and auxiliary units and accessory equipment.

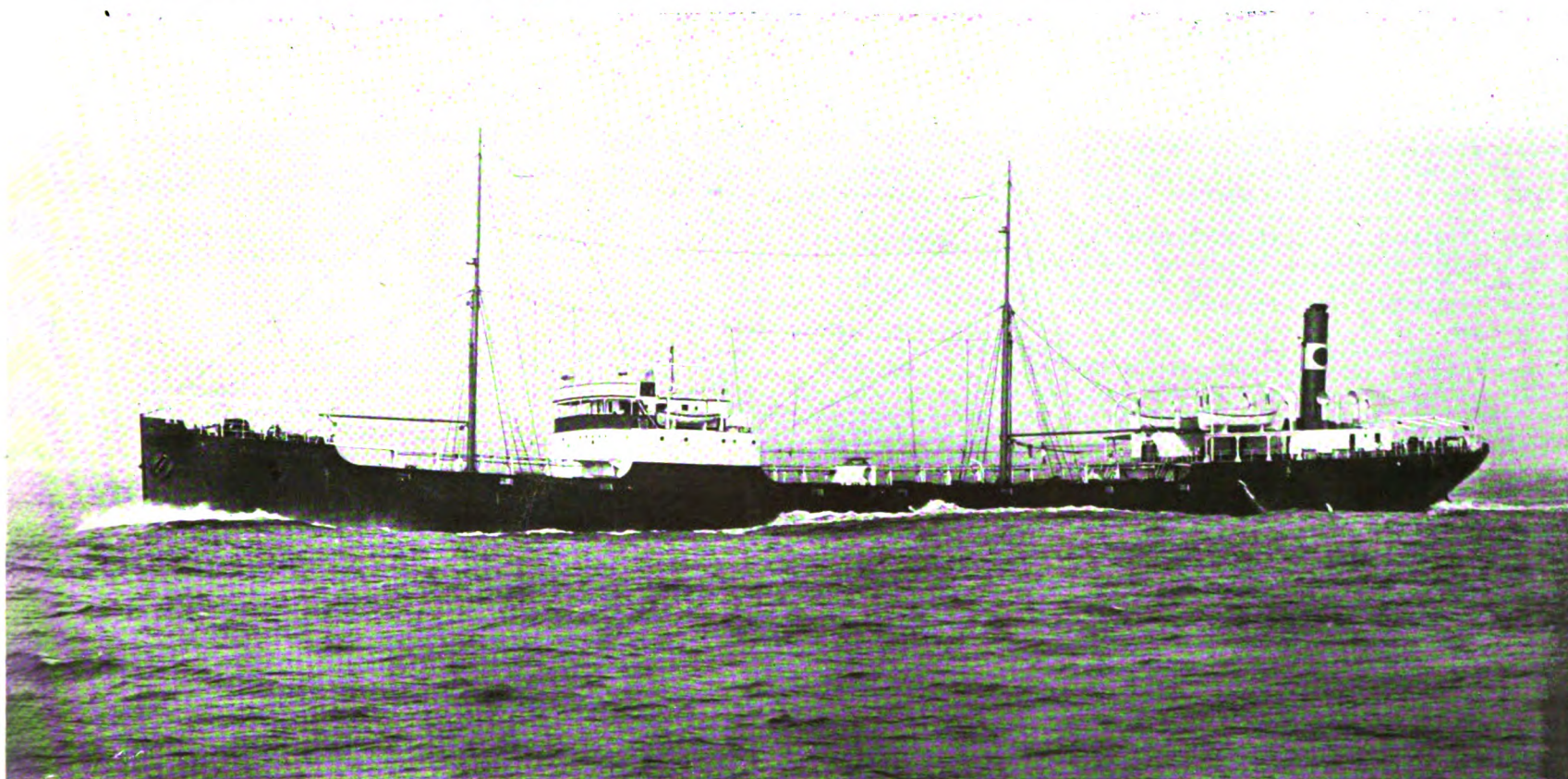
Obviously there is such a thing as false economy, especially where advertising is concerned. Prestige once lost or forgotten is hard to regain, particularly if superseded in the public mind by other products.

FUEL-CONSUMPTIONS OF MOTORSHIPS.

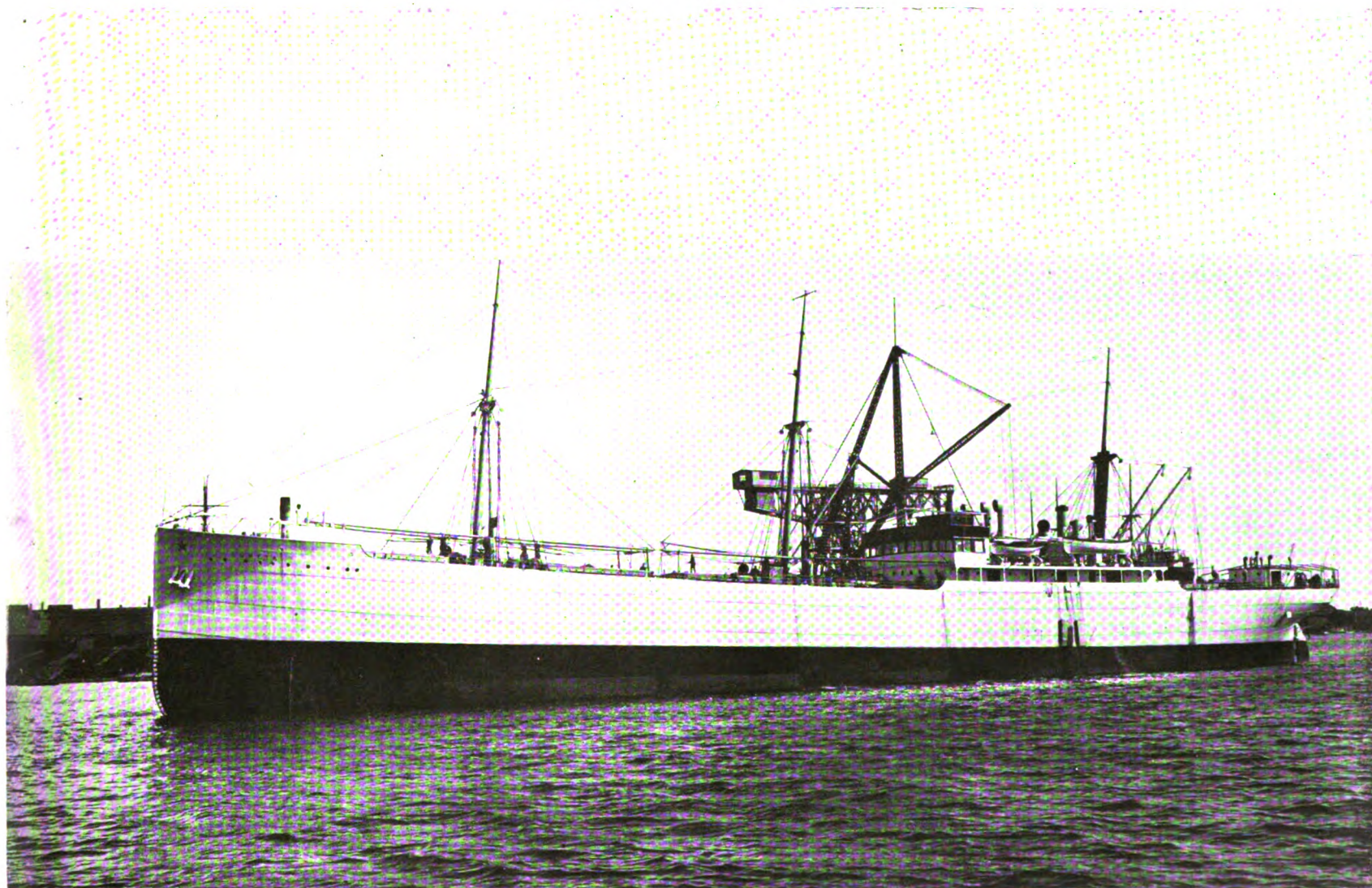
When consulting-engineers and shipbuilders more or less unfriendly to the Diesel-engine propulsion base their operating comparison costs (which they make on the behalf of shipowners) on correct average actual consumptions of existing motorships, this type of merchant-vessel will take another rapid advance in America. It was revealed in the recent discussion on Messrs. Metten & Shaw's paper before the Society of Naval Architects that several well-known steam engineers claim that the fuel consumptions of motorships are 0.45 lbs., 0.515 lb. per shaft h.p. hour, and 0.37 lb., 0.43 lb. and upwards per indicated h.p. hour, with the result that the final figures furnished to their shipowner clients are inaccurate and misleading. Attention of these engineers is drawn to the fuel-consumption of the Shipping Board's new motorship "William Penn" on her loaded sea trials reported elsewhere in this issue. An average speed of 11.77 knots was attained on a consumption of 13.6 tons of Diesel-oil per 24 hours for all purposes. According to the power developed this figured-out at 0.308 lb. per indicated horse-power hour. This is only about one-fourth the consumption of the average consumption of the Board's oil-burning steamer fleet.

While a Thousand American Steamships Lie Idle

An Unusually Large Number of New Diesel Motorships Have Just Completed Trials, Many of Which Are Illustrated or Reported in This Issue, Including the Two Fine Vessels Depicted Below. But, Only One Big Motorship Illustrated in This Issue is American, and She Has European Engines. When Will the Shipping Board and Private Shipowners Awake to the Change in Maritime Conditions?



Motor-tanker "Conde de Churruga" on her recent trial-run. A speed of 11.8 knots was attained by means of her twin 1,250 shaft h.p. Armstrong-Sulzer Diesel-engines. She was built for the Cia General Cie Tabacos de Filipines by Sir Wm. Armstrong Whitworth & Co., of Newcastle, England



New 6,500 tons cargo motorship "Cometa" after her dock trials prior to loading a cargo of cement for South America.. Fuel-consumption 124.6 grams per i.h.p. hour. She was built by Burmeister & Wain for the Johnson North Star Line, but was sold before completion to the Bergen Steamship Co., who own the new Werkspoor-Diesel engined freighter "Estrella" ex "Athens," the big Diesel auxiliary "Grossherzog Friedrich August," and two 6,500 ton motorships now building at Burmeister & Wain

Interesting Notes and News from Everywhere

BRITISH DOUBLE-ACTING DIESEL ENGINE

Successful trials of a double-acting Diesel engine have been run at Vicker's Works, England.

ANOTHER PAPER BY MR. BLACHE

At Gothenburg a paper on Twin versus single-screw drive was recently read by Director Blache of Burmeister & Wain.

POWERFUL WARSHIPS!

Eight new capital ships with 16 in. and 18 in. guns will be laid down by England during 1921 or 1922. The orders have been placed!

MORE HARLAND & WOLFF MOTORSHIPS

"Loch Goll," "Loch Manar," "Inverleith," "Wind-sor Castle" and "Montezuma," are the names of some of the new motorships completing by Harland & Wolff.

ROTTERDAM LLOYD'S MOTORSHIP

"Kedoe," is the name of the 6,500 tons d.w.c. motorship referred to in our September issue as building at Burmeister & Wain's to the order of the Rotterdamsche Lloyd Co.

WHITE SURFACE-IGNITION OIL ENGINE

To the list of surface-ignition oil-engine builders in our "YEAR BOOK" may be added the name of J. S. White & Co., Ltd., the well-known ship-builders of East Cowes, Isle of Wight, England.

NEW FRENCH DIESEL-ENGINE

Construction of marine Diesel engines has just been commenced at the Bordeaux works of the Chantiers et Ateliers de La Gironde, which recently amalgamated with the Société Normande de Constructions Navales of Harfleur. This company should be added to the list of Diesel-engine builders in our "YEAR BOOK."

ANOTHER BRITISH MOTORSHIP

Now under construction at the yard of Charles Hill Ltd., is a 4,500 tons d.w.c. motorship to the order of Owen & Watkin Williams & Co., of Cardiff, Wales. Two North British Diesel-engines will be installed. This shipyard, it will be remembered, are also building two motorships for the British India Steam Navigation Co.

UNION STEAMSHIP COMPANY'S NEW 10,600 TONS D.W. MOTORSHIP "MAURAKI"

Reference has frequently been made in these columns to the Union Steamship Company's (New Zealand) new cargo-motorship building by Wm. Denny & Bros., Dumbarton, Scotland, and which is being fitted with twin 2,330 i.h.p. North British Diesel engines. The vessel was launched on August 24th, and was named "Mauraki." Her length is 450 ft. by 58 ft. breadth and 42 ft. depth.

PERFORMANCE OF THE "GLENAPP"

In seven months the motorship "Glenapp" of the Glen Line has covered 28,000 nautical-miles in 2,616 hrs., 56 mins. running time, on the London-Far East via Suez Canal route. One of the non-stop runs on this route is 5,160 miles. She is of 14,000 tons d.w.c., and at 11 knots speed she only burns 12.84 tons per day, or 21 tons at 12½ knots. Her maximum speed is 13 knots.

For the purpose of utmost economy she is run at 10¾ knots during present depressed trans-ocean freight conditions, effecting an additional saving of about \$50.00 per day in fuel. The fuel burned is Mex-Diesel oil of 0.904 gravity at 60 deg. Fahr. Approximately every 45 days the exhaust-valves are ground in.

STERN-WHEELER FOR THE NILE

A shallow-draft motor-vessel for special survey work on the River Nile is now under construction at the Shipyard of Rennie, Ritchie & Newport Shipbuilding Co. Ltd., England, for the Egyptian Government. This vessel is of the stern-wheel pontoon type, 60 ft. long by 16 ft. breadth and 4 ft. draught. She is propelled by a 50 h.p. Plenty surface-ignition oil-engine at 300 r.p.m.

MARINE EXPOSITION AT NEW YORK

During the week of November 14th next, a marine exposition will be held under the auspices of the Marine Equipment Association of America,

in the Central Mercantile Building, N. Y. C. Applications for space should be sent to the Association, Woolworth Bldg., N. Y. C.

ELDER DEMPSTER CO.'S NEW MOTORSHIPS

"Ediba," is the name of the new 10,000 tons d.w.c. motorship referred to previously as being built by Harland & Wolff for the Elder Dempster Co. of Liverpool, England. Twin 1,800 i.h.p. Harland & Wolff B. & W. Diesel-engines are being installed. The name of the new 14,000 tons 6,600 i.h.p. Diesel motorship also building for the same owners by this company has not yet been given out. Reference to their big motorship "Aba" is made elsewhere in this issue.

FATAL ACCIDENT TO J. A. PYKE

With sincere regret we note that one of our oldest subscribers and keenest readers, J. A. Pyke of Montreal, was killed on Sept. 7th at Toronto when his racing motor-boat "Claire III" was rammed and sunk by the "Leopard VI" following winning of a 20-mile race by the "Claire III." Mr. Pyke who was president of the Pyke Motor & Yacht Company, displayed much interest in "Motorship" and on a number of occasions personally purchased many copies of this publication for distribution to his business friends. We had the pleasure of meeting him on several occasions and found him of most genial and delightful personality. His firm are the Eastern Canada distributing agents for the McIntosh & Seymour Diesel-engine, and for the Gulowsen-Grei surface-ignition oil-engine.

BERGEN STEAMSHIP COMPANY ACQUIRES MOTORSHIPS

Having increased its fleet within the last six months by about 40,000 tons deadweight, the Bergen Steamship Company, of Bergen, Norway, is becoming one of the largest and most important shipowning concerns in Norway. Their success will be assisted by the fact that they are very much alive to the great efficiency and economy of Diesel-drive motorships during this existing period of low freight. Previously they have been steamship owners, but they have now added to their fleet the 6,500 tons Diesel-motorship "Cometa" now completing at Burmeister & Wain's yard at Copenhagen. This vessel they purchased from the Swedish North Star Line.

In addition they have secured the 9,700 tons d.w.c. motorship "Athene" which they have named "Estrella." This craft is fitted with twin 1,400 i.h.p. Werkspoor Diesel-engines of the latest type.

Then again, they have taken over the German training-ship "Grossherzog Friedrich August," which is a large Diesel-engined auxiliary sailing-vessel, with accommodation for 200 apprentices, as well as cargo. The power plant consists of a 600 b.h.p. Tecklenborg-Carels two-cycle Diesel-engine, which is of similar design to the engine built by the Nordberg Manufacturing Company, of Milwaukee, Wisconsin.

Furthermore, the Bergen Steamship Company have two 6,500 tons motorships on order with Burmeister & Wain. They are similar to the "Cometa."

LAUNCH OF THE MOTORSHIP "BALZAC"

At the Odense Shipyard the first of the 1,350 tons motorship to the order of Fred Olsen of Christiania was launched August 30th. She and her sister vessel were illustrated and described in our issue of March 1921, pages 217-218. Both these vessels are being equipped with the new trunk-piston type Burmeister & Wain engines similar to the two installed in the motorship "Fritze," now operated by Bugge & Oslen of Larvik. This engine was illustrated and described in our issue of Feb., 1921, page 119. In the case of the second ship for Fred Olsen, an engine of similar type but of a little large size, namely 900 i.h.p. at 130 R.P.M. is being installed. On her vacated berth the keel was at once laid for the sister ship. The engines of the "Balzac" have a bore of 15.748 by a stroke of 29.527 and develops 450 shaft h.p. at 145 R.P.M. on a consumption of 1.9 tons per 24 hours.

TRIALS OF MOTOR PASSENGER LINER "ABA"

Recently trials were run in Scottish waters of the big motorship "Aba" ex "Glenapp," now

owned by the Elder-Dempster Company, and to be placed along the West African run carrying passengers and cargo. This Diesel-engined vessel was originally built for the East Asiatic Company in 1916, but was taken over by the Glen Line during the war and employed for carrying troops and cotton between the U. S. A. and Great Britain. Recently she was purchased by the Elder-Dempster Co. and has just been converted into a passenger-liner. She is of 6,600 I. H. P. and was built by Barclay, Curle & Co., and engined by Harland & Wolff. Her dead-weight capacity if solely a cargo-ship would be about 14,000 tons.

LAUNCH OF DANISH MOTORSHIP "POLAR HAVET"

Some time ago the Atlantic Steamship Co. ordered a number of single-screw 8,000 tons turbine motorships from the new Southern yard of the Copenhagen Floating Dry Dock Co. of Copenhagen. As reported in "Motorship" they afterwards decided to arrange for the changing of one of these ships to Diesel power at considerable cost, having concluded that the economies effected in operation will soon mean a business economy. This vessel, the "Polar Havet" (Arctic Sea) was launched on August 31st and was towed to Burmeister & Wain's yard at the same port, where she is now being fitted with 2,800 i.h.p. Burmeister & Wain Diesel-engine set and standard auxiliary equipment.

SALE OF A DANISH WOODEN MOTORSHIP FLEET

Among "war babies" in Europe may be mentioned that of the "Dragor" Motorship Company of Copenhagen, which was formed in 1916 for the purpose of operating a number of small wooden motorships. These vessels were recently purchased by the Halla Company, the manager for whom is Mr. T. C. Christensen. This concern is said to be backed financially by the Diskontobank of Copenhagen. It is interesting to note the war-time value of the wooden ships of this fleet, compared with their present values as per the following list:

Vessel	Tons	Book Value	Sold for
		Kr.	Kr.
M.S. "Drogden"	600	372,489	126,000
M.S. "Rosin"	600	574,060	81,000
M.S. "Karl"	600	372,993	29,000
M.S. "Olaf"	350	228,884	25,000
M.S. "Hans"	300	117,626	29,000
M.S. "Lynetin"	600	582,943	95,000
*M.S. "Dragor"	600	(See Foot Note)	
**M.S. "Kongedybet" .	600	.....	.....

*Lost in storm.

**Sold at profit of 140,000 kroner.

Nevertheless, it is also significant to note that these little wooden motorships were sold for considerably more than the wooden steamships of the Shipping Board's Fleet, which are seven times as large in tonnage per ship. The prices for these Danish wooden motorships were obtained at public auction.

PRESENT PRICES OF WOODEN MOTORSHIPS

By order of the U. S. District Court at Norfolk, Va., the sale of the wooden motorship "Trolltind" to F. S. Pendleton of New York for \$3,450 was ordered "off." The U. S. Marshal had auctioned her, but the price was declared by the Court to be grossly inadequate. An upset bid of \$5,000 was offered by the Colonna Marine Railway Corporation. The present day price of her twin Diesel-engines is far higher than either of the above two bids.

Recently the 1,800 tons d.w.c. Canadian-built wooden motorship "Cap Nord" powered with twin 240 b.h.p. Atlas-Imperial Diesel-engines was sold by the Wm. Lyall Shipbuilding Co. to J. H. Petersen of Birmingham for £2,000 (about \$8,000). She cost about \$250,000 to build.

However, in comparison with these prices it is interesting to note that the shipping Board's steam-driven wooden ships of larger tonnage which cost twice as much to build are only bringing about \$2,500 each. We are glad to see that the Norfolk court decided that motorships are more valuable to-day.

[Thru pressure on space many interesting news notes have been held-over until our next issue.—Editor.]

Diesel-Electric Ferry for Poughkeepsie

FOR many months a motor ferry-vessel has been under consideration by the Poughkeepsie & Highland Ferry Company for their service on the Hudson River, and recently the contract for this hull was awarded to the Atlantic-Gulf & Pacific Company, Mill Basin Shipyard, Brooklyn, N. Y. Designs of this vessel have been prepared on the "arconstruct" system by C. V. S. Wyckoff.

As yet the order for the propelling machinery has not been definitely placed, but probably the contract will be signed before this appears in print. It is proposed to instal twin six-cylinder four-cycle type Winton Diesel-engines of 150 b.h.p.

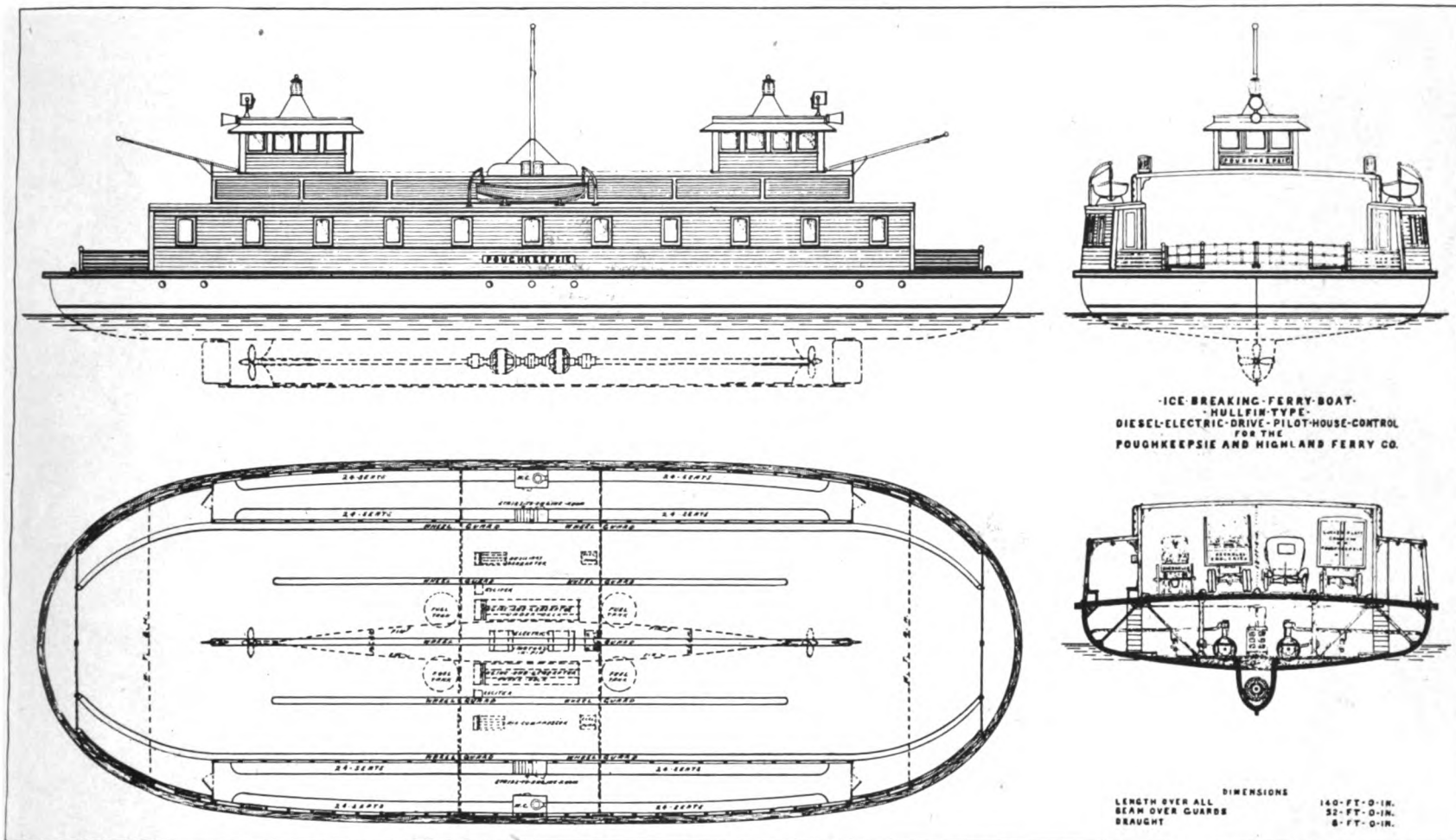
New Winton-Westinghouse Powered Motorship Ordered for Service on the River Hudson

at 450 R.P.M. coupled to two 90 K. W. Westinghouse D. C. generators. These will furnish current for two 100 b.h.p. Westinghouse electric-motors on the double-ended propeller-shaft, and either one or both of the motors at one time.

The ferry has the following dimensions—
Length over guards 140 ft.
Length overall 137 ft. 6 in.
Length of "fin" overall 80 ft.
Breadth over guards 52 ft.

Extreme Draught 10 ft.
Power of Main Diesel Engines 300 b.h.p.

The hull is shoal and broad, and is built according to the "arconstruct" or "hullfin" design similar to the canal-tug illustrated and described on page 389 of our issue of May, 1921, which by the way, has not yet been laid down. Among the advantages claimed for a ferry-boat constructed on this system is that it will accommodate twice as many automobiles as an ordinary ferry boat of the same size, on account of the fact that all the machinery is located below decks. In other words it permits four lines of vehicles instead of the customary two.



Plans of Hullfin type ferry-vessel for the Poughkeepsie & Highland Ferry service on the River Hudson. Winton Diesel-engines and Westinghouse electric-propulsion are to be installed

Some New Motorships

MOTORSHIP FOR HIGH SEA FISHERIES

Recently completed for the Hamburger High Sea Fisheries A/G was a cargo motorship 184 ft. long by 23 ft., 11 in. breadth and 18 ft., 4 in. draught. Twin Diesel-engines are fitted.

NEW GERMAN CONCRETE MOTORSHIP

Now completing at the Stoerwerft shipyard, Vewelsfleth, Germany, is a concrete motorship 83 ft., 6 in. by 28 ft., 4 in. by 15 ft., 1 in. in which 500 shaft h.p. Diesel-engine is installed.

TWO MOTORSHIPS FOR SCHINDLER OIL CO.

Two of the 308 ft. 1,550 shaft h.p. Diesel-engined motorships building at the Deutsche Werft's Finkenwaerder shipyard are for the Schindler Mineral Oil Works of Hamburg, Germany.

LAUNCH OF FIRST HOLLAND-AMERICA LINE MOTORSHIP

"Dinheldijk," the first of the two new 14,000 tons deadweight 6,600 i.h.p. 12½ knot cargo motorships for the Holland-America Line of Rotterdam, as launched at Harland & Wolff's Govan shipyard on Sept. 1st. She is 502 ft. long by 62 ft. breadth and 38½ ft. depth and twin 3,300 i.h.p. Harland & Wolff B. & W. Diesel engines are being stalled.

DEUTSCHE WERFT AND DEUTSCHE WERKE

Reference has already been made to motorships under construction at the Deutsche Werft at Hamburg. But, motorships and Diesel-engines are also building at the Deutsche Werke at Kiel-Friedrichsort (Bay of Kiel), Rustringen, Germany, which we believe is quite distinct from the Hamburg concern. The plant at Kiel is the old German Admiralty's navy-yard.

BLOHM & VOSS MOTORSHIPS

Regarding the four Diesel-engined cargo motorships building for the Hamburg-American Line at the Blohm & Voss shipyard, Hamburg. They have the following dimensions—

Length	Breadth	Depth	Stage of Completion
450	58	37½	55%
450	58	37½	40%
447	58	37½	6%
447	58	37½	2%

It is reported that the Diesel engines will be of the double-acting two-cycle type. Two 398 ft. Diesel-engined motorships are also building for the Hamburg-American Line at the Deutsche Werft, Finkenwaerder. Four-cycle, single-acting engines are being fitted.

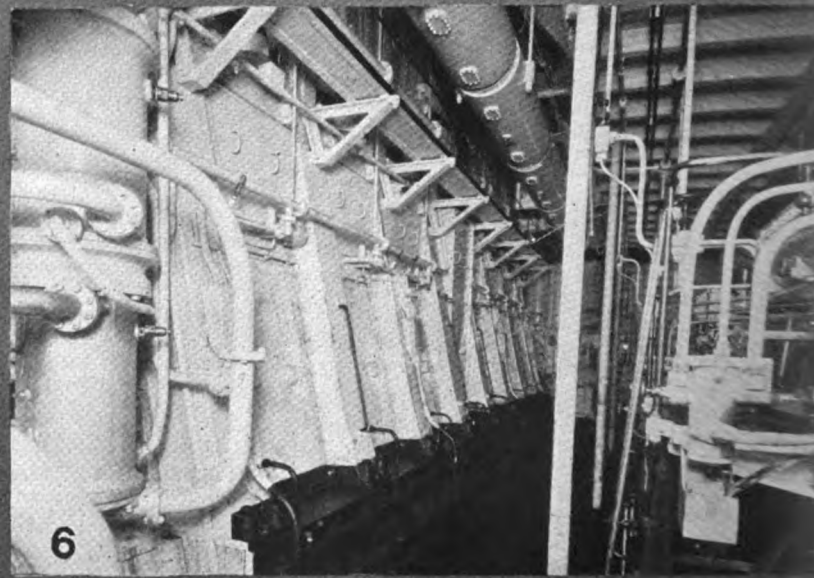
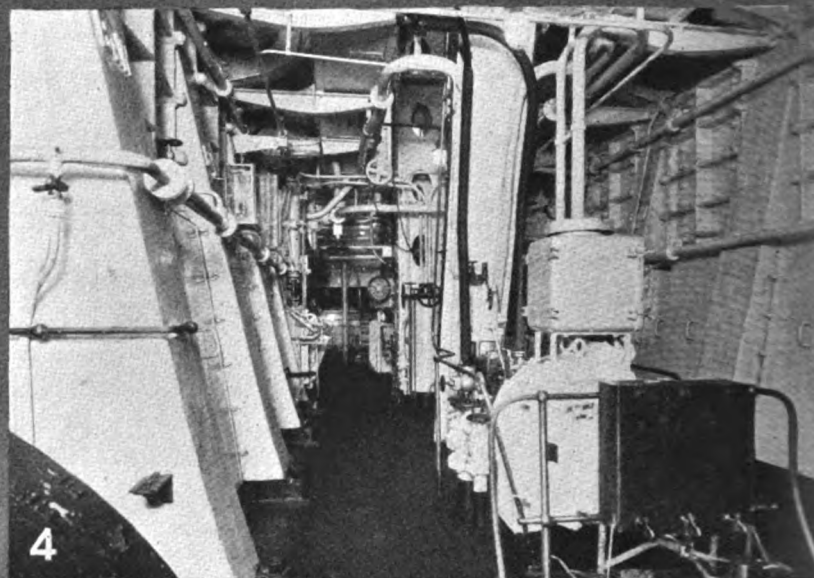
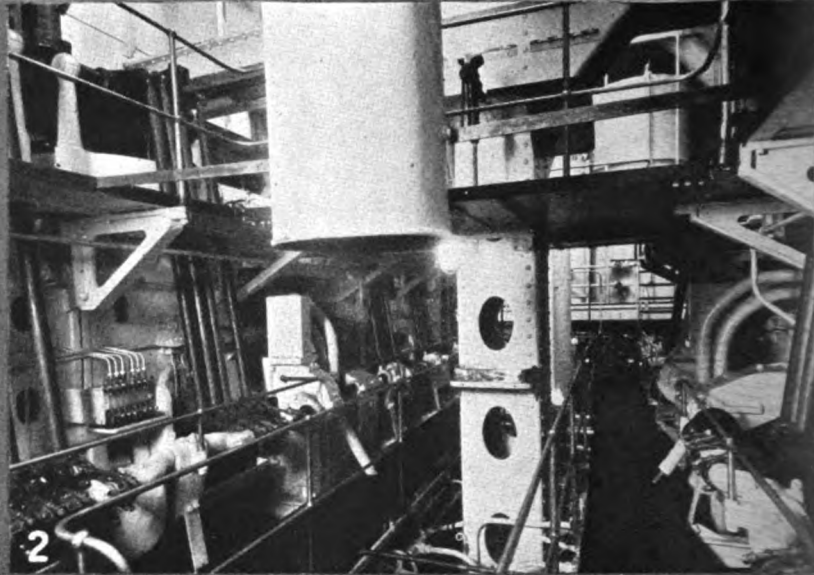
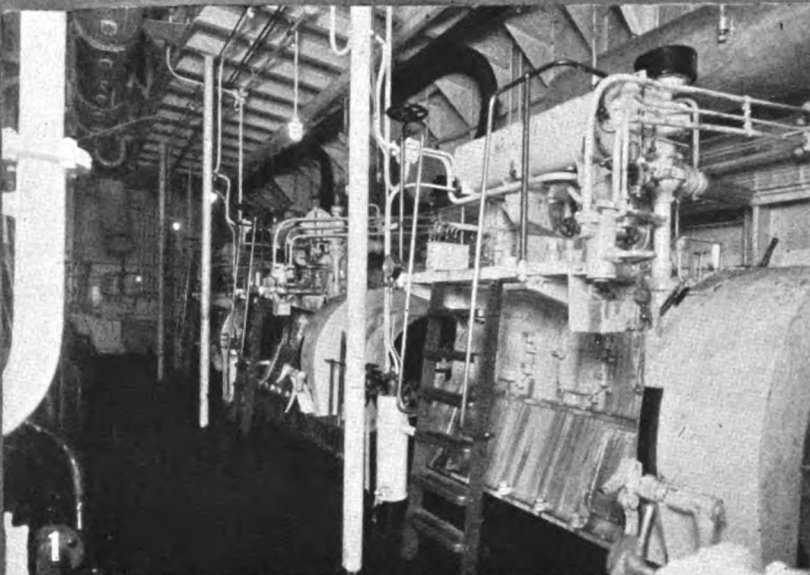
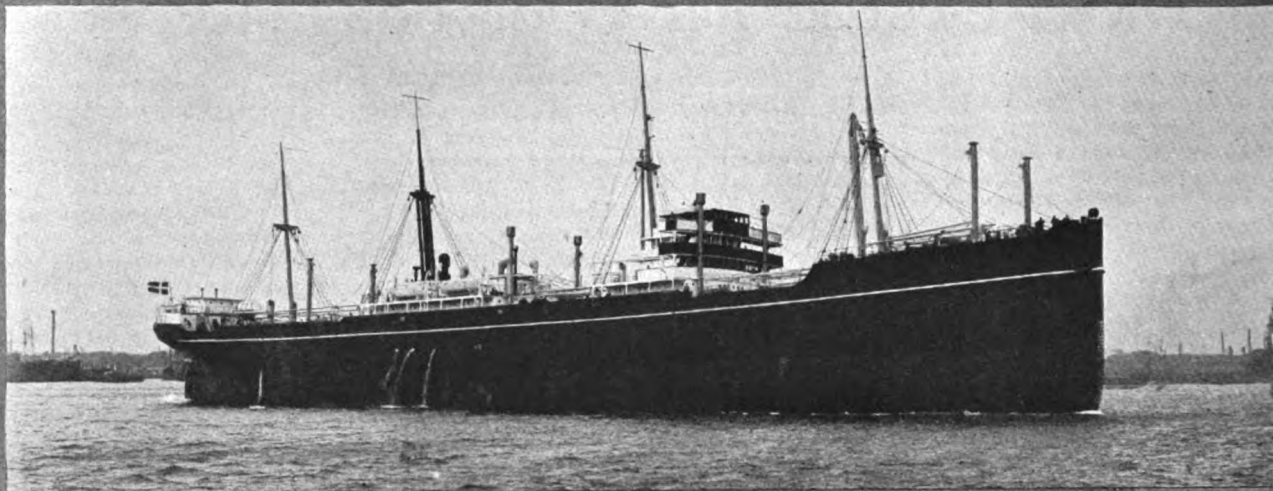
FURTHER DETAILS OF THE M.S. "LOCH KATRINE"

The Royal Mail Steam Packet Co.'s first new big motorship "Loch Katrine" (announced in our September issue as having been launched at John Brown & Co.'s Clydebank shipyard) has the following dimensions—

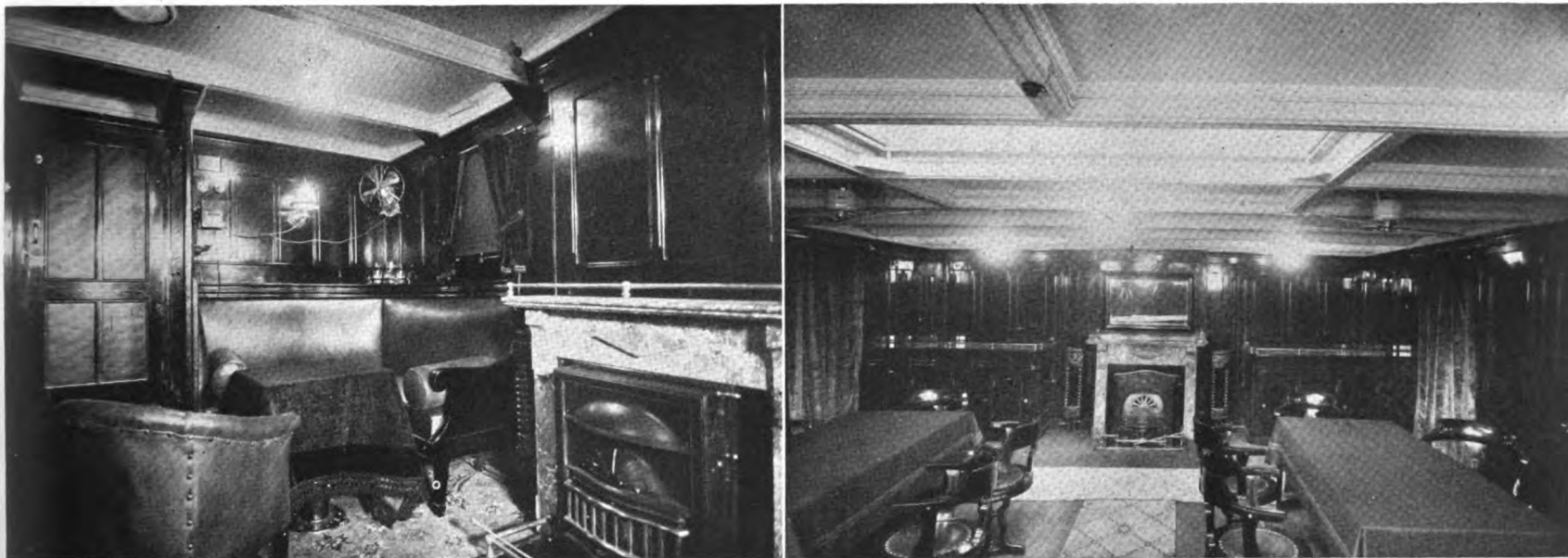
Displacement 19,000 tons
Deadweight Capacity 14,000 tons
Gross Tonnage 9,000 tons
Cargo Capacity, Fruit.....1,500 tons
Cargo Capacity, General.....9,500 tons
Total Cargo Capacity (not including bunkers),
11,000 tons

Passenger Capacity.....12 first-class
Power 6,600 i.h.p.
Speed (loaded) 12½ knots

She has fourteen electric-winsches, six being of the McFarlane-Pirrie 40 tons type, first illustrated in our issue of November, 1920, in connection with our exclusive article on the Pacific Steam Navigation Co.'s (a subsidiary of the R.M.S.P. Co.) motorship "La Paz," at which time we were privileged to make the first announcement regarding the "Loch Katrine" and her forth-coming two sister motorships. The "Loch Katrine" and her two sister motorships will be operated in conjunction with the Holland-America Line's 14,000 tons motorship "Dinheldijk" and her sister motorship, between the Pacific Coast of America to Europe carrying American products.



THE EAST ASIATIC CO.'S NEW DIESEL MOTORSHIP "MALAYA"
 (1) Port side of engine-room showing three auxiliary Diesel-electric generating-sets. (2) Camshaft-level platforms between two main engines. (3) Upper grating showing cylinder-heads and valve-rockers.
 (4) Starboard side of engine-room showing the heavy engine-frames, pump, etc. (5) Refrigerating-set and manœuvring-air compressor. (6) Back of port main-engine.



Smoking-room and dining-saloon of the Werkspoor Diesel-engined cargo motorship "San Paulo," illustrating the class of accommodation to be found where a few passengers are carried

NEW MOTORSHIP "MALAYA"

In previous issues we referred to the motorship "Malaya" built for the East Asiatic Company of Copenhagen by Burmeister & Wain, which recently ran trials. She is a vessel of 13,500 tons d.w.c. and of 4,500 I. H. P., so is of considerable importance. Furthermore, she is a sister vessel to the motorship "Afrika" placed in service in March of last year, and her propelling machinery is similar to that installed in the Shipping Board's vessel "William Penn." The principal dimensions of the "Malaya" are as follows:

Loaded displacement	19,000 tons
Net cargo-capacity (when fully loaded with general cargo and fuel for 20,000 miles, water, storage, etc.)	12,350 tons
D. W. C.	13,500 tons
Cubic capacity	700,000 cu. ft. grain or 600,040 cu. ft. of bales
Length (O. A.)	464 ft., 6 in.
Length (B. P.)	445 ft.
Breadth (O. F.)	60 ft.
Breadth (A. D.)	42 ft.
Depth (U. D.)	33 ft., 3 in.
Depth (L. D.)	23 ft., 3 in.
Loaded draught	32 ft.
Fuel-capacity	1,472 tons
Cruising radius (maximum)	30,000 nau. miles
Gross tonnage	9,050 tons
Fuel-consumption	13 to 14 tons per day
Loaded speed	12 knots

She is a four-masted vessel and has 20 electric-winches installed by the A. S. E. of Vesteras, which is the Swedish General Electric Company. One of the derricks is of 50 tons capacity, another one of 30 tons, twelve of 5 tons and eight of 2 tons. Her steering-gear is of the hydraulic-electric type

constructed by John Hastie & Co., of Greenock, Scotland. The windlass is also electrically driven.

In addition to the large amount of cargo that can be carried, excellent accommodation is provided for twelve passengers in the deck-house beneath the bridge. Accommodation for the crew is aft and arranged for two men per cabin. Her propelling machinery is arranged amidships and consists of two 6-cylinder four-cycle type Burmeister & Wain reversible Diesel-engines of the crosshead type developing together 4,500 I. H. P., the cylinders having a bore of 29.134 in. by 45.178 in. stroke.

It is interesting to note that on the trials an average speed of 13.1 knots was maintained with the ship light, displacing 6,180 tons. When averaging this speed the engines were together developing 4,585 I. H. P. with a fuel-consumption figuring out at 14.8 tons per 24-hour, or 135.3 grams per I. H. P. hour. The draught forward was 17 ft., 5 in. and 15 ft., 9 in. aft.

Her auxiliary machinery follows the usual plan with vessels of this class, namely, there are three 100 b. h. p. four-cycle B. & W. Diesel-engines each driving a dynamo of 66 K. W. 220 volts, furnishing power for all the engine-room auxiliary machinery, the electric steering-engine, windlass and winches. For lighting the ship the current is transformed to 110 volts by means of a rotating transformer. There is also an emergency electric-lighting set. Electricity is also used for driving the refrigerating machinery which is of the Sabroe type, described and illustrated in "Motorship" some months ago. For heating purposes there is a small donkey-boiler with a surface-area of 100 sq. ft. On July 16th the "Malaya" left on her maiden voyage for the Far East.

LAUNCH OF MOTORSHIP "HANDICAP"

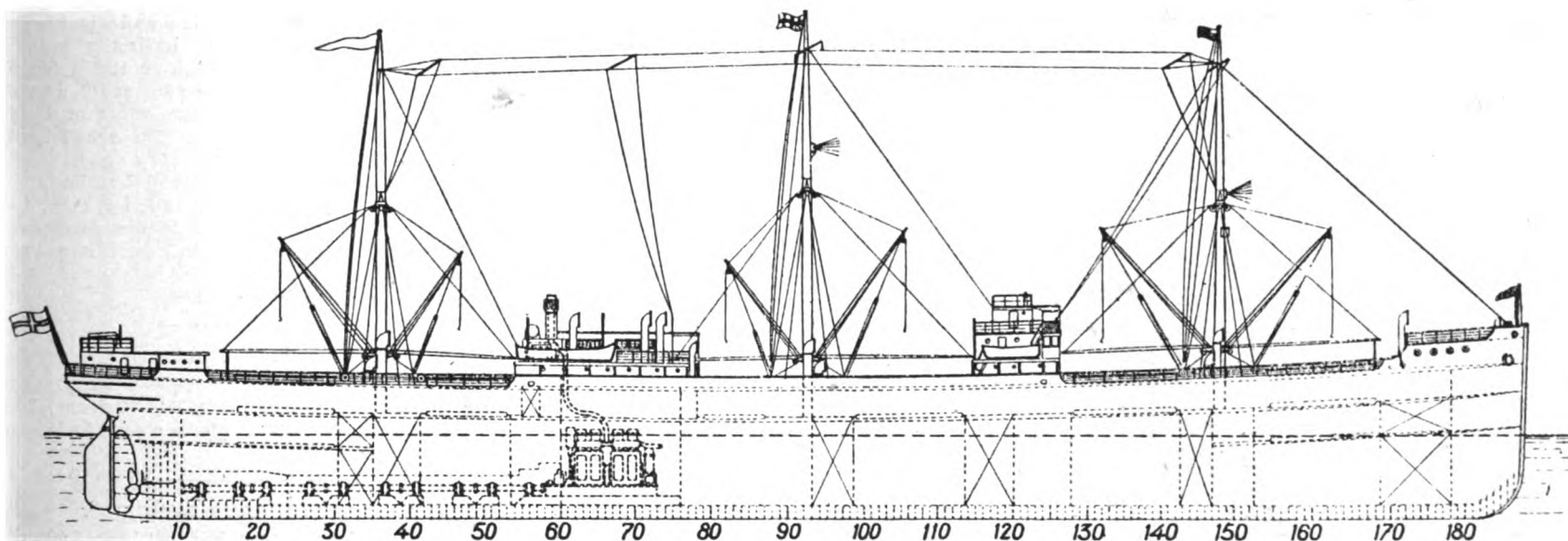
On the 4th of August the 9,000 tons motorship "Handicap" was launched to the order of Bruusgaard, Kiosterud & Co., Dramen, and it is expected she will be ready for her trials during November. This vessel is of 9,000 tons d.w.c. and is equipped with twin 1,600 shaft h.p. Sulzer two-cycle Diesel-engines. She is notable as being the largest motorship constructed in Norway. Originally she was contracted by Olsen Bros. of Stavanger, but afterwards taken over by her present owners.

ANOTHER SWEDISH MOTORSHIP

"Josef Bergendorff," a motorship of 1,150 tons d.w.c., has just been completed at the Bergsunds Shipbuilding Yard near Stockholm to the order of the Stjarnen Shipping Company of Karlstads. She is propelled by a 500 shaft h.p. oil-engine giving her a speed of nearly 9 knots when fully loaded. Her construction is to the Norwegian Veritas classification.

LJUNGSTROM COMPANY ABANDONS TURBINE-ELECTRIC DRIVE

It may interest you to know—writes a well-known Swedish engineer—that one of the first turbine manufacturers in Scandinavia who used electric transmission, the Ljungstrom Steam Turbine Company, recently abandoned the electric drive on account of its low efficiency, and installed mechanical-friction clutches, using friction disks for reversing and power transmission. Such friction clutches would of course be subjected to far more severe stresses in connection with a Diesel-motor with its varying turning effort than with a uniformly running steam turbine.



"Handicap," the 9,000 tons motorship with twin 1,350 b.h.p. Sulzer Diesel-Engines building at the Rosenberg Shipyard for Bruusgaard & Kjoesterud of Dramen. She was launched on August 4th, 1921

Injection and Combustion of Fuel-Oil

(Continued from page 655, August issue)

At mean indicated-pressures at and above 110 lbs. per square-inch, the experimental engine running at 380 r.p.m., smokeless combustion could not be satisfactorily obtained with the solid-injection system and as it was desirable that higher mean indicated-pressures should be developed, it was decided to experiment with the air-injection system. The ordinary air-injection valve will be referred to later, but it is proposed briefly to refer, at this stage, to a valve which may be regarded as a combination of the air- and solid-injection systems.

In the ordinary air-injection valve the fuel is forced into the fuel-valve casing against the pressure of the injection air, but no advantage is derived from the pressure to which the fuel-oil is subjected. In the modified valve the oil is sprayed in the manner common to solid-injection systems; but inside the cylinder it meets a jet, or jets, of air so that the distribution is thereby improved. It was hoped that by the use of such a valve a smaller quantity of blast-air would be required than is necessary with the ordinary air-injection valve. Further, in the event of the air-compressor failing the engine would be able to run at a slightly lower power satisfactorily on solid-injection alone. Various valves were tried based on this principle, both with the air-jets surrounding the fuel-jets and also with the fuel-jets surrounding the air-jets, but it is not possible within the limits of this treatise

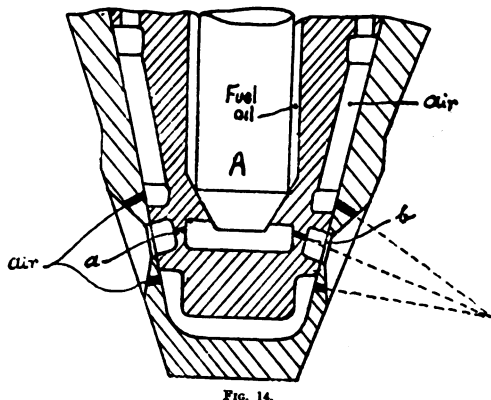


FIG. 14.

to refer to more than one valve which has given promising results when using shale fuel-oil.

Fig. 14 shows diagrammatically a section of the sprayer end of the valve. A is lower end of the automatic-valve and the fuel-oil passes into the combustion space through the small holes a, b, etc., when the valve is lifted. Four air-holes surround each fuel exit, so that four small air-jets meet the fuel-spray in the combustion-space at a small angle. In the experimental engine an air-valve operated by a separate cam controls the supply of high-pressure air to the air channels shown. This arrangement was made to facilitate experiment, but it is probable that in a valve of this type for naval use one cam would be used for controlling the admission of both air and fuel. The engine can be started on the solid-injection system alone, and therefore it is possible to employ a lower compression-ratio than would suffice to ensure an easy start from the cold condition with the ordinary air-injection system in use.

It has so far been found that with this valve smokeless combustion can be obtained with a mean indicated-pressure of just over 130 lbs. per square-inch—the experimental engine running at 380 r.p.m. The consumption of blast-air is slightly less than with the ordinary air-injection valve. The fuel-consumption at about 130 lbs. means indicated-pressure, using shale-fuel-oil, is just under 0.41 lb. per b.h.p., but as the air-compressor is driven by an electric motor this does not take into account the power required to supply the blast-air. The valve combining the solid- and air-injection systems has some advantages over the ordinary air-injection valve, but it undoubtedly involves greater complication. Experiments are being continued and the question of its adoption will, of course, depend upon the results obtained after prolonged trials.

Experiments with Solid-Injection and Air-Blast in Marine Diesel Engines

By ENGINEER-COMMANDER C. J. HAWKES

PART VI

When using the ordinary air-injection system for developing comparatively high mean-pressures in high-speed engines it is necessary to use a distributor provided with holes so that a number of small jets are produced. Fig. 15 shows the lower end of a fuel-valve designed for a 20-inch by 20-inch experimental four-stroke cycle engine. The number and size of the holes in the distributor to give the best all-round results is a question of trial. The angle of the holes, as in the case of the solid-injection sprayer, is largely dependent on the shape of the compression space.

A few details of tests carried out with various fuel-valve distributors in a single-cylinder opposed-piston two-stroke engine may be of interest.

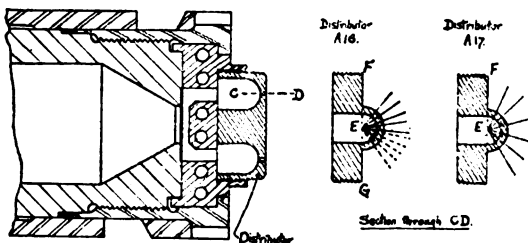


FIG. 15.

This engine was designed and constructed by Messrs. William Doxford and Sons, Sunderland, originally for their own use, but before the engine had been run it was transferred to the Admiralty Engineering Laboratory. The engine follows the firm's usual design and has a cylinder diameter of 14.55 inches and a combined stroke of 28.3 inches. It is fitted with two water-cooled fuel valves. The double-acting scavenge pump and four-stage air compressor are driven from two cranks on an extension of the engine shaft. The scavenge pump and compressor were made larger than necessary for ordinary running, for the purpose of supercharging experiments at a later date, and consequently this reduced slightly the mechanical efficiency of the engine. During the tests referred to in this paper the engine, owing to the

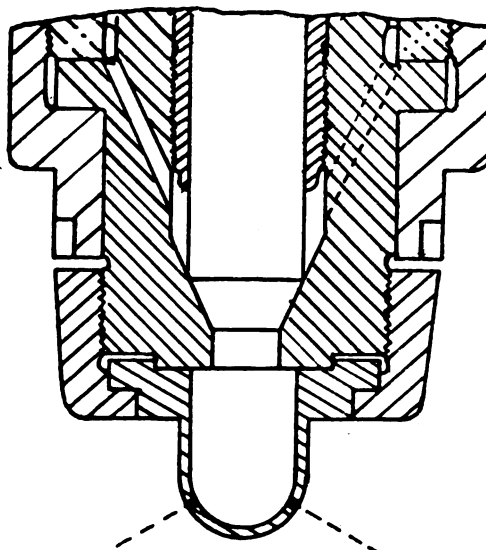


FIG. 16.

lay-out of the Laboratory, exhausted into a pipe 180 feet in length. [This engine was referred to in the treatise by Commander Hawkes previously published in "Motorship."—Editor.]

The sprayer, or distributor, of each fuel-valve as originally designed was provided with two narrow slits intended to give horizontal fan-shaped sprays. The centre line of each spray was about 1/2 inch from the top of the adjacent piston—the distance between the pistons at the end of compression being about 1.75 inches. A number of tests at various powers were carried out with the original distributors shown in Fig. 16 with various

shapes of cams, etc., and it was found that the fuel consumption at the higher powers and speeds increased rapidly with an increase in mean-pressure.

From the experience gained with the experimental 14 1/2 inches by 15 inches four-stroke engine it was clear that fuel-sprays having a comparatively large surface were not satisfactory, as when working at high speeds and high mean indicated-pressures late burning resulted. It was decided, therefore, that further improvements in the fuel consumption of the opposed-piston engine could only be obtained by replacing the original distributors by distributors provided with a number of holes. The design of the original valves was such that it was necessary to cut off the ends of the valve bodies and replace them by ends which could be adapted to take experimental distributors provided with circular holes. Fig. 17 shows the experimental distributors as fitted. This illustration will be given in the next installment.

Each distributor was provided with two rows of holes. The centre lines of the holes were made parallel to the flat tops of the pistons, and the angles of the holes in the horizontal plane were arranged to give the best distribution. The diameter of each hole depended on its distance from the cylinder liner in the direction of the spray and on the volume of that portion of the combustion-space which it had to feed, and it was arranged that each row of holes should sweep over approximately half the surface of the adjacent piston. (The centre lines of the two fuel-valves in the horizontal plane are parallel but slightly offset.) A number of distributors of this type were tested, and it was found that the best all-round results were obtained with the distributor A 16.

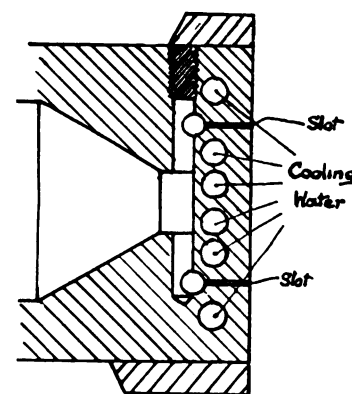


FIG. 17.

of which a horizontal section is shown in Fig. 17. The upper row of holes in each distributor is indicated in the figure by the full lines and the lower row of holes by the dotted lines. Table 5 which also will be given with the next installment gives the sizes and angles of the holes. The mean results of a series of tests carried out with the A 16 distributors are shown in Table 6 and Fig. 18. The fuel used was Texas fuel-oil having a specific gravity of 0.91 at 60 deg. F., flash point 195 deg. F. (close test), viscosity 318 seconds at 70 deg. F. (Redwood No. 1), and a calorific value of 18,400 B. T. U. (lower heating value). The exhaust was clear throughout the tests.

The maximum power developed by the A 16 distributors was 406 B. H. P. at 364 R.P.M., the mean indicated pressure being 150 lbs. per square inch. The exhaust was not black at this power; but it was dark.

(To be continued)

MOTORSHIP "TOSCA" VISITS NEW YORK

The new 6,990 tons twin-screw Werkspoor-engine motorship "Tosca" left New Orleans, La., on August 27th for London. She is owned by Winge & Co., of Christiania.

WERKSPoor PAYS DIVIDEND.

A dividend of 8 per cent. has just been declared by Werkspoor of Amsterdam, the well-known Dutch Diesel marine-engine builders.